M. E. LERNER
Editor

W. GLEED COE
Production Manager

R. E. GAINES
Circulation Manager

PETER P. PINTO
General Manager

THE RUBBER AGE

ESTABLISHED 1917

One of the World's Outstanding Rubber Journals

FEBRUARY
1939

VOLUME 44
NUMBER 5

INDEX TO CONTENTS

Practical Application of Petroleum Solvents in Rubber Cements—*By J. K. Stewart and D. D. Rubek* 267

Glycerine Keeps Pace with Rubber Developments—*By Georgia Leffingwell and Milton A. Lesser* 270

Rapid Roller's New Laboratory 271

Shellac in Rubber—*By D. W. Mulford* 272

Eck "Universal" Calender 273

Charles Goodyear (A Biography)—*By P. W. Barker* 275

Appellate Court's Decision in Vultex vs. Heveatex Suit 278

REGULAR DEPARTMENTS

New Equipment Section 282
Book Reviews 283
Editorials 284
Late Domestic News 285
Financial News 291
Names in the News 289
New England News 290
Obituaries 292
Los Angeles News 293
Rubber, Cotton Markets 295
Chemical Markets 296
Statistics 297
Market Place 303
Classified Ads 308

Also Publishers of:

RUBBER RED BOOK
Directory of the Rubber Industry
Published Bi-Annually
Next Issue—April, 1939

ANNUAL BIBLIOGRAPHIES OF RUBBER LITERATURE
Compiled by D. E. Cable, Ph.D.
First issue covers year 1935

LATEX IN INDUSTRY
By Royce J. Noble, Ph.D.
Text Book on Latex

LATEX AND ITS INDUSTRIAL APPLICATIONS (Vol. I)
By Frederick Marchionna
Bibliography of latex patents and literature to June, 1932.

LATEX AND RUBBER DERIVATIVES AND THEIR INDUSTRIAL APPLICATIONS (Vols. II & III)
By Frederick Marchionna
Bibliography of latex patents and literature from June, 1932 to January, 1937; rubber derivatives to January, 1937.

Published on the 15th of each month by

PALMERTON PUBLISHING COMPANY, INC.

Printing office,
East Stroudsburg, Pa.

Editorial and Advertising Offices,
250 West 57th St., New York City

Entered as Second Class Matter, October 20, 1933 at the Post Office at East Stroudsburg, Pa., under Act of March 3, 1879. Subscription Rates: Domestic, $2.00 a year; Canada, $2.50; Foreign, $3.00. Single copies up to 3 months old, 25 cents; over 3 months old, 50 cents. Telephone COlumbus 5-2923, 5-2924. Contents Copyrighted 1939 by the Palmerton Publishing Company, Inc. Indexed in Industrial Arts Index. OFFICERS: P. L. Palmerton, President; E. D. Osborn, Vice-President and Secretary; Peter P. Pinto, Treasurer.

Aminox

A General Purpose Antioxidant

AMINOX **is a powdered ketone amine reaction product, similar chemically to B-L-E. It disperses and processes exceptionally well in rubber, and discolors *very little.***

Have **you investigated the possibilities of improving the quality of your products through the use of *Aminox?***

Samples and detailed information are available upon request.

AMINOX
is now in use
IN TIRES
•
INNER TUBES
•
WIRE INSULATION
•
MECHANICALS
•
FOOTWEAR
•
RUBBERIZED CLOTHING

NAUGATUCK

Naugatuck Chemical

DIVISION OF UNITED STATES RUBBER COMPANY

1790 BROADWAY NEW YORK, N. Y.

The Rubber Age

Published Monthly at East Stroudsburg, Pa.
Editorial and Advertising Offices: 250 W. 57th St., New York

Vol. 44 February, 1939 No. 5

The Practical Application of Petroleum Solvents in Rubber Cement

By J. K. Stewart and D. D. Rubek
Anderson-Prichard Oil Corporation

Part I—By J. K. Stewart

A FEW years ago the title of this paper would have been "The Practical Application of Gasoline for Rubber Cements." In those days we were roughly in the position of the Model T Ford fans. I refer to those fans who itched for more color in things. In response, it is said that Ford agreed that we could have a Model T in any color we might wish, just so that it was black. In the same way we could have any kind of petroleum solvent in those days, as long as it was aviation gasoline.

Well, times have changed. Now the cement man has a number of petroleum rubber solvents to choose from. Later on situations will be described which were successfully handled by the selection of a suitable solvent. As a background for these practical factory problems, I first want to picture briefly a theoretical explanation of rubber cement and why it behaves as it does.

Perhaps some of my readers could have sympathized with me as I walked into my first job in the rubber industry. Rubber, and the handling of it, was indeed a mystery to me. Then, as possibly now, Firestone was digging up facts in favor of gum dipping. My first problem was to study cements. The first objective was to get more rubber into solution. So with the help of my associates a pressure bomb was made. On the top was fastened a pressure gauge. On the sides was smeared alundum cement, then nichrom wire was wound around it as a heating element. Crepe rubber was cut up and dropped into the bomb. Then rubber solvent was added—just enough to make a concentrated cement. Heat was applied to vaporize some of the solvent, with the object of driving the air out.

The gauge was then bolted on. Heat was continued until the pressure rose to roughly 150 pounds. After an hour or two the bomb was allowed to cool. The gauge was then removed and the bomb turned upside down. Ordinarily with so much rubber and little solvent we would have expected a very stiff gel. Instead, however, the mass meandered out of the bomb like very heavy cold molasses. It was smooth, however, and apparently thoroughly mixed.

What happened? I wondered in those days and many times since. Lately, I browsed through the literature hoping that I might find an explanation for this gooey mass. The following paragraphs will give some indication as to what I found out. For those seek-

This paper is based on an address given by the authors at the February 10, 1939, meeting of the Chicago Group, Rubber Division, A.C.S.

ing more specific information, a number of references will be found at the conclusion of this paper.

The structure of rubber has been the title of many a scientific paper. When it is all boiled down, however, the main conception pictures rubber as a scrambled bunch of spaghetti. In order to explain certain characteristics, one ingenious investigator has conceived the idea of making the rubber spaghetti jointed like bamboo. Now what happens when milling takes place? Apparently a certain amount of tearing occurs, the spaghetti breaking at some of the joints. "Oh, no," say some other investigators, "it is the oxygen that does the work. The oxygen acts as a wedge and weakens the joints or even pries them apart." Whichever explanation describes the situation best, the result appears to be broken rubber spaghetti. Now what happens when rubber is dropped into the rubber solvent?

In the case of unmilled rubber, the scrambled spaghetti literally soaks up the liquid. The solvent fills up the holes. The solvent acts as a wedge to weaken the joints. In the case of milled rubber, the broken spaghetti also soaks up the liquid, but, since the pieces are shorter, the mass is not so scrambled. Obviously, it would be harder to put the scrambled spaghetti through a funnel than it would the broken up mass.

Now what happens when a non-solvent is added to a rubber cement? Sometimes the non-solvent makes the rubber "give." It makes it shrink. This action gives more solvent for the spaghetti to swim in, thus making it easier for the mass to flow through the funnel. Sometimes the non-solvent dissolves in the solvent, so what looks like a lot of solvent and non-solvent shrinks to the volume of the solvent.

As every rubber man knows, milling has by far the greatest effect on the viscosity of the rubber solution. The action of the solvent might change with the type of rubber, for example, pale crepe as compared to smoked sheet. So the viscosity aspect will not enter into this paper.

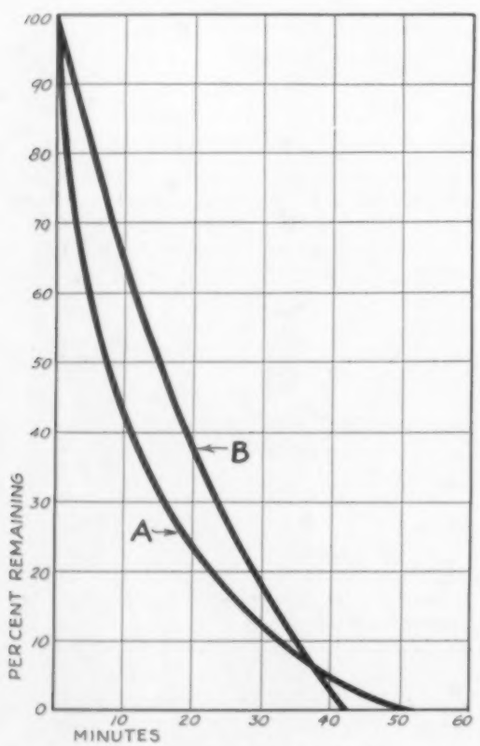


Fig. 1.—Evaporation Curves of Petroleum Rubber Solvents.

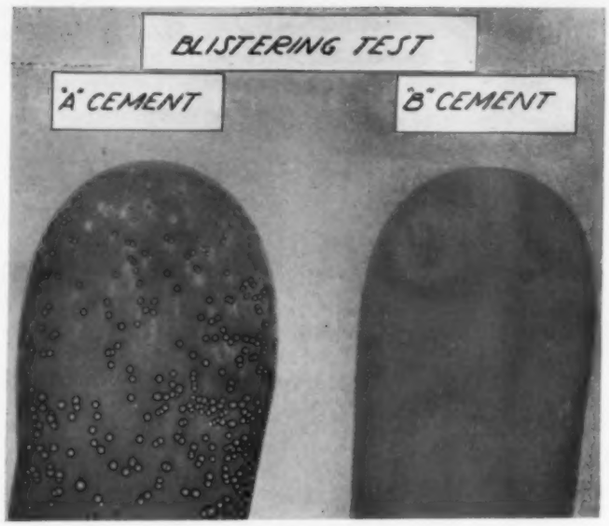


Fig. 2.—Results obtained from an aggravated test.

In the experiments previously referred to, dilute rubber solutions of 2% or less were used. Of special significance, therefore, is the paper of T. Foster Ford in 1937. Ford worked with factory types of cements ranging in concentration from 10 to 30%. In his paper, Ford enumerated the following utility characteristics of a rubber cement: (1) Smoothness; (2) Film thickness, including (a) Adhesive value and (b) Protective value; (3) Readiness of film to break; (4) Viscosity; and (5) Stability.

In 1927, D. F. Twiss enumerated the requirements of a rubber solvent as follows: (1) Chemical stability towards rubber, oxygen, moisture, sulfuryl chloride and fire risk; (2) Restricted range of distillation; (3) "Odor not extremely unpleasant"; and (4) Relatively non-toxic. In looking these over we may see where petroleum thinners enter into the picture. Taking first the requirements of the rubber solvent into consideration, discussion of the major points follows herewith.

Chemical Stability: It is interesting to note that the use of rectified turpentine as a rubber solvent was described as early as 1761. This is an oxygen carrier. This fact may furnish the clue as to why this solvent is rarely used today. The following facts are likewise of interest. The discovery of the solvent power of petroleum fractions was made by Fabroni in 1791. Discovery of the solvent power of coal tar fractions was made by MacIntosh in 1823.

It is noteworthy that the two earliest rubber patents, one by S. Peal in 1791 and one by H. Johnson in 1797, both involved the production of rubber solutions, according to Twiss. Looking at stability from the viewpoint of rubber cement, Ford points out the tendency for gelling in a cement. One way of overcoming this tendency is by the use of more of the solvent.

Restricted Range of Distillation: Twiss says, "The liquid of lower molecular weight possesses the greater swelling power. This swelling power of a solvent has an interesting bearing on the rate of 'drying' of a rubber solution when applied to a vulcanized rubber foundation, *e.g.*, in repairing air tubes." The solvent which will "dry" more rapidly is the solvent which can penetrate more rapidly into the rubber below.

Looking at this item from the viewpoint of rubber cement, Ford makes the following statements: (A) "Drying time is directly controlled by evaporation rate through choice of solvents indirectly by temperature and humidity." (B) "The readiness of a film to break is affected by evaporation rate." As regards the film thickness, he says: (C) "A large number of qualitative observations by the writer indicate that, in general, solvents which evaporate quickly give thicker films than solvents which evaporate slowly." Carrying this further, he notes that the film thickness is a factor in both adhesive and protective value. (D) "Film smoothness is affected by the evaporation rate of the solvent as explained by Vortex action. Vortex action is akin to convection current found in a beaker of water that is being heated. Vortex action may cause agglomeration of sulfur, thus decreasing the effective sulfur concentration."

It is important that the film be smooth and the pigments be distributed uniformly. So the rubber technologist is confronted with a real problem when he gazes at his row of petroleum rubber solvents of varying volatility and varying evaporation curve characteristics. Which will do the best job? He has to select the right one. To illustrate the practical significance of the rubber solvent in the factory, one or two examples will be described.

REFERENCES

T. R. Griffith, *Canadian Journal of Research*, **10**, pp. 486-520 (1934).
Boggs & Blake, *Ind. Eng. Chem.*, **22**, pp. 748-755 (1930).
Whitby, *Trans. Inst. Rubber Ind.*, **5**, pp. 184-195 (1929).
Rubber Chem. & Tech., **8**, p. 23 (1935).
Boiry, *Caoutchouc et Gutta Percha*, **21**, pp. 12386-9 (1924).
Whitby, *Trans. Inst. Rubber Ind.*, **6**, pp. 40-62 (1930).
Rubber Chem. & Tech., **8**, p. 375 (1935).
Staudinger, "Die hoch molekularen organische Verbindungen Kautschuk und Cellulose," p. 379.
Busse, *Ind. Eng. Chem.*, **24**, p. 140 (1932).
Staudinger, *Trans. Inst. Rubber Ind.*, **10**, pp. 263-279 (1934).
Whitby, "Fourth Colloid Symposium Monograph," pp. 203-23 (1926).
B. Dogadkin and G. Pantschenkow, *Kautschuk*, **7**, pp. 198-202, 217-219 (1931).
Rubber Chem. & Tech., **8**, p. 259 (1935).
Markus Reiner, *Physics*, **5**, pp. 342-347 (1934).
Kraemer and Williamson, *J. Rheology*, **1**, p. 76 (1929).
C. A., **26**, 3958 (1932); 5451 (1932).
B. Dogadkin, *Kolloid-Z.*, **53**, pp. 239-245 (1930).
D. F. Twiss, *Trans. Inst. Rubber Ind.*, **2**, pp. 381-408 (1927).
T. Foster Ford, *I. R. W.*, **95**, pp. 42-44 (1937).
Hatschek, *Kolloid-Z.*, **12**, p. 238 (1931).
Van Rossem, *J. Soc. Chem. Ind.*, **36**, p. 1104 (1917).
Kirchhof, *Kolloid-Z.*, **15**, p. 30 (1914).
McBain, *J. Physical Chem.*, **30**, p. 239 (1926).

Part II—By D. D. Rubek

IN this portion of the discussion we want to take up the behavior of various petroleum solvents with rubber. We have learned in the first part what is thought to be the action of solvent on rubber. In this part of the discussion we will compare the indicated working qualities of two petroleum solvents when used with rubber. For this purpose we will compare two commercially used petroleum solvents, "A" and "B."

As pointed out earlier, the working qualities of cements are often affected by various factors such as temperature, humidity and moisture condensation. From some of our laboratory tests, and also from discussion with members of the industry, the comparative values of two cements as judged by working qualities are difficult to determine. The best method we have found of making such comparisons is by an aggravated test. Aggravated tests are pertinent not alone to the rubber industry, but are used in the paint, lacquer, ink, polish and other industries.

At this point let us consider something of the physical nature of the two solvents to be compared—"A" and "B." Perhaps one of the qualities of the solvent which most greatly affects its use in cements is the evaporation rate. Figure 1 is an evaporation chart showing the evaporation rates of "A" and "B." Percentage evaporated is shown graphically with increase in time. It will be noted that "B" dries slower in the beginning. This would reduce the tendency for moisture condensation. It will also be noted, however, that "B" is completely dry in less time than "A." This might indicate less tendency for entrapped vapors.

Both "A" and "B" were used to prepare rubber cements composed of ⅓ pound of unmilled crepe rubber to a gallon of solvent. An aggravated test was then made to compare the tendency to pinhole or blister. The results obtained are shown in Figure 2.

Another application for cements is in rubber dipping. In the dipping of such articles as rubber gloves, webbing time is a factor, due to reflows and resulting weak places in the glove. Web-breaking time can be judged by dipping slotted metal pieces in the cements. Results of the webbing test to which "A" and "B" were submitted are seen in Figure 3. Note that cement "B" required less time for the web to break.

We might next consider effect of oil residue in rubber solvent. Residue of this nature is generally believed to have a deteriorating effect on rubber. What effect this residue might have on rubber cement is indicated by samples of dried rubber cement we prepared. Into one dish "A" cement was poured. Into another, "B" cement. Upon drying, the dishes had been refilled several times with cement. It was noticed that the rubber deposit in the dish containing "A"

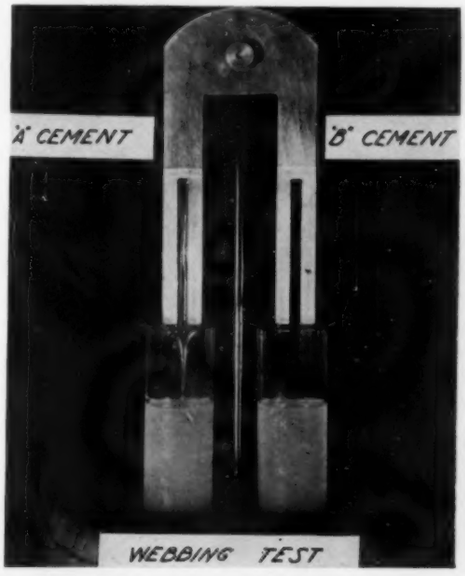


Fig. 3.—Results of the webbing test.

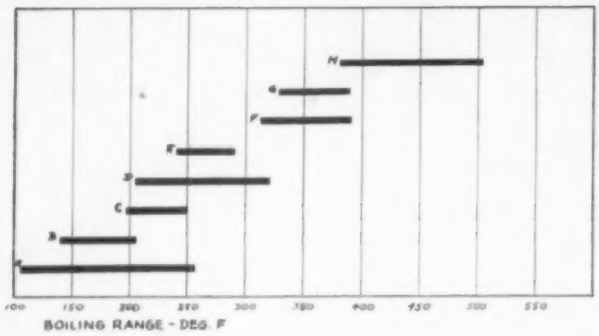


Fig. 4.—Rubber Solvents Available on the Market.

A—Fraction in Aviation Gasoline Range; B—in Petrobenzoe Range; C—in Trolucil Range; D—in VMVP Range; E—in Apcothinner Range; F—in No. 10 Mineral Spirits Range; G—in Apco 125 Range; H—in Kerosene Range. (Note: Further details on these same solvents will be found in the table).

RUBBER SOLVENTS AVAILABLE ON THE MARKET

Specifications		A	B	C	D	E	F	G	H
Distillation	I.B.P.	105°F	140°F	196°F	206°F	238°F	312°F	326°F	379°F
	5%	135	150	202	216	246	320	335	420
	10%	145	153	208	218	248	324	338	428
	20%	155	156	210	220	250	328	340	434
	30%	165	159	212	221	252	332	344	440
	40%	175	162	214	228	256	336	347	443
	50%	185	165	217	230	260	340	350	446
	60%	190	168	220	234	264	344	354	452
	70%	195	172	225	240	266	350	358	459
	80%	205	178	228	250	270	358	364	466
	90%	225	186	236	260	276	368	372	479
	95%	235	196	246	272	282	378	380	490
	Dry Point	255	206	250	278	288	388	388	502
Gravity (Bé @ 60°F)		69°	70.5°	59.5°	59.0°	56.0°	50.0°	49.0°	43.0°
Flash Point (T.C.C.)		–40°F	–16°F	25°F	22°F	52°F	100°F	118°F	150°F
Comparative Spot Dry		35″	25″	50″	1′15″	1′30″	9′30″	10′	90′
Pounds per Gallon		5.85	5.86	6.19	6.23	6.35	6.53	6.56	6.76

cement was spongier than that in the dish containing "B." As for adhesion, in one test in which a spring balance was used the "B" cement showed about 10 to 15% greater adhesion.

It should be apparent from these tests that the working qualities of rubber cement can definitely be effected by the type of petroleum solvent used. There are, of course, a number of rubber solvents available. These are indicated in Figure 4, while the accompanying table gives more specific data on these solvents.

Glycerine Keeps Pace With Rubber Developments

By Georgia Leffingwell and Milton A. Lesser

NEW advances in rubber technology continue to find new applications for the unusual combination of properties inherent in glycerine. A recent application of glycerine in vulcanizing processes, reported at the Rubber Technology Conference at London during May, 1938, promises to be of especial significance. Here R. Thiollet reported a method, the result of extensive experiments and studies, for ultra-rapid vulcanization in glycerine at high temperatures.

Several base mixtures were employed and several accelerators tested (of which the best four were selected) and other studies were made, including tensile properties, rate and time of vulcanization, etc. With this glycerine-containing apparatus the process was rapid and uniform, with no tendency toward premature vulcanization. Thiollet indicates that vulcanization in glycerine should be of particular value in connection with continuous rubber manufacturing processes, such as making electric cables and the like.

The value of glycerine as a safe, efficient, economical lubricant for rubber has long been known and used. Particularly significant in this connection is the recent work of Aquadro and Barbour, reported in the *American Journal of Nursing*. Working with rubber catheters, though the data gathered could be readily applied to any other type of rubber goods, they found after a series of experiments that glycerine is the best lubricant for the rubber articles tested, as compared with mineral oil. At the end of 37 boilings after lubrication with mineral oil the tube was non-resilient and no longer usable. The tube lubricated with glycerine, however, was firm, resilient and only slightly lighter in color even after 200 boilings. These studies showed that glycerine is not only the most beneficial, safest lubricant for rubber, but the most economical in the long run.

Recent instances of the use of glycerine as a lubricant are given in a British patent (478,102) for making non-skid cuts as an integral part of the tire. Glycerine is one of the recommended lubricants to prevent adhesion of the rubber during vulcanization. A process for preserving the suppleness and elasticity of rubber goods employs a mixture that is essentially a glycerine solution, containing lime juice and other ingredients.

Glycerine's newer specialized uses include a process for making a chlorinated rubber product of a gummy or resinous character, by interaction at 140° C. of this fluid with chlorine-containing rubber (U. S. Pat. 2,094,-933). In making specialty coatings for paper and the like, where rubber or rubber latex dispersions are used, glycerine is frequently included as a hygroscopic plasticizing and softening agent (Brit. Pat. 425,941; U. S. Pat. 2,021,947). Rubber-containing adhesives include glycerine in the formulas for very similar purposes. Among recent examples will be found a rubber adhesive, made with glycerine, for bonding paper and thin metal sheets (Fr. Pat. 788,987) and another for labelling oiled or inked surfaces (U. S. Pat. 2,073,927).

The glycerine-containing alkyd or glyptal synthetic resins are also finding newer uses, particularly for creating grease-resistant and water-resistant coatings.

In the field of rubber substitutes, glycerine has made important valuable advances. One recent development that has aroused considerable interest is the process of Kittredge (U. S. Pat. 2,111,427; Fr. Pat. 810,225) for making a rubber substitute by heating a mixture of a polymerized vegetable oil and glycerine until reaction takes place. Among the oils employed are tung, soy bean, oiticica, perilla, linseed and cotton seed oils. Not only does this substitute exhibit most of the characteristics of natural rubber but it has additional desirable properties of its own. This glycerine-oil product can readily replace the natural item in many processes and, furthermore, is unaffected by oils, greases and many acids and alkalis. Other glycerine-containing rubber substitutes are listed in the patent literature.

Rapid Roller's New Laboratory

THE laboratory staff of the Rapid Roller Company, manufacturers of rubber-covered rolls and printer's blankets, recently occupied its new quarters in a newly-constructed three-story addition to the Chicago factory. The new laboratory is several times the size of the old one and is complete in every detail. The building housing the laboratory was constructed at a cost of $150,000.

The layout of the new laboratory consists of three main divisions: (1) Analytical and Physical Testing; (2) Compounding and Processing; and (3) Pilot plant and small scale production for new products. The divisions are separated from each other by sound and fireproof walls. A feature of the laboratory is an especially large and well-catalogued storeroom. Another is a completely stocked library.

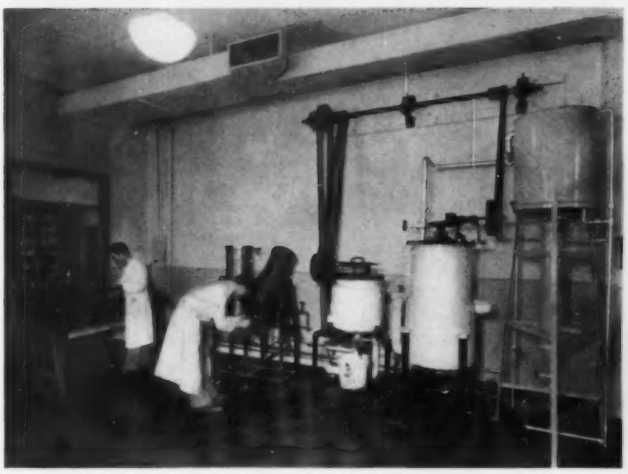
The analytical and physical testing division of the laboratory plays an important role in the standardization of the quality of the many types of rollers produced by the company. All raw materials and fabrics are tested in this division before being placed into production processes. After the various compounding ingredients have been milled together, samples are brought back to this division and tested again.

This division of the laboratory is especially well-equipped for the analysis of products generally used in the printing industry, such as inks, solvents, etches, preservatives, etc. New compounds are being continually tested to determine their ink resistance qualities, strength, and other characteristics, to determine their suitability for use in the manufacture of the company's products.

The compounding and processing division is equipped with a four-roll calender, laboratory mills, hydraulic presses, steam vulcanizer, composition melting kettles and molds, and rubber roller building facilities. In this division experimentation with compounds devised by the analytical and physical testing department is conducted, and finished products made on a small scale.

The third division of the laboratory, housing the pilot plant, is used for the purpose of producing any new products developed by the other laboratory divisions. It is equipped for small scale production of commercial products and is an important branch of the factory itself.

Photographs of all three divisions of Rapid Roller's new laboratory are reproduced below. These indicate the comfortable conditions under which the staff works. The laboratory, which is thoroughly air-conditioned, is under the supervision of Mr. F. G. Arnold, chief chemist of the company.



Shellac in Rubber

Experimentation Has Led to Wider Use of Shellac as a Compounding Ingredient to Produce Greatly Improved Products

By D. W. Mulford

William Zinsser & Company, New York, N. Y.

DURING the last two or three years there has been a sizeable increase in the amount of shellac used in the rubber industry for compounding purposes. This increased use has come about largely as the result of certain advantages which shellac gave to both the processing of stocks and to the finished products. In brief, it has been found that shellac acted as a softening agent, helped to wet fillers, and improved the extruding and calendering properties of rubber stocks. Finished products, on the other hand, were found to be less porous, to have a better finish, and to have greater aging, heat, oil and electrical resistance. Further advantages are enumerated in greater detail below.

Original Use of Shellac in Rubber

Originally, shellac was used largely in soles and heels, flooring and in rubberized products. Later it was found to offer advantages in molded and mechanical goods, hard rubber products, and extruded articles. In recent months it has been adopted by manufacturers of insulated wire, in synthetic rubber products, and in the field of chlorinated rubber articles. Tests now indicate that it will shortly be put to use in dipped goods and in several branches of the latex field, as well as in many other rubber products.

As a result of the widening applications of shellac, William Zinsser & Company set up its own research laboratory a few years ago and soon determined that the crude native shellacs were entirely unsuitable for use in rubber compounding. Specifically, we arrived at the following conclusions: (1) That to realize the full benefits to be had by combining shellac with rubber, the cleanness, uniformity and special qualities to be found in specially prepared scientific shellac were essential; (2) That certain very important and definite improvements in a number of rubber products could be accomplished by incorporating a shellac with these properties; (3) That very little change in compounding or manufacturing procedure was necessary, but that a very definite procedure must be followed and certain ingredients used to allow shellac to impart its desirable properties to rubber.

Based on this series of investigations we developed methods for the proper use of shellac in rubber and applied for a patent on both the invention of a composition of matter comprising vulcanized rubber and shellac and for the process of making such compositions. This patent was granted to William Zinsser & Company on December 20, 1938 (U. S. Pat. 2,140,527). This patent represents the culmination of almost five years of research and development work in trying to determine, first, how best to incorporate shellac with rubber; second, how to cure shellac-rubber stocks; and third, what are the effects and advantages of shellac in rubber. In this important work we were fortunate in having the active assistance of Mr. Charles R. Haynes, of New York, well known rubber technologist.

As stated, it was early discovered that crude native shellacs, which had been tried abortively at various times, were unsuited for the work. These native shellacs were variable, much too dirty, while some grades contained rosin and orpiment. It is small wonder, then, that they never proved satisfactory to rubber compounders. The research we have been conducting involves the use of a specially prepared scientific shellac manufactured by Angelo Bros., Ltd., in Calcutta, India, which is made by modern methods under the supervision of a highly skilled and technical staff.

Scientific shellacs are all uniform and are free from dirt and insoluble matter. One grade was found to be best suited for general use in rubber, having all of the desired properties for most uses, and, moreover, being relatively low in cost. If certain specific properties in finished products are desired other grades may be used to advantage. It has been found that these scientific shellacs disperse well in all types of rubber, and that their use does not necessitate any radical changes in compounding technique.

Our investigation also covered the effect produced by shellac on various compounding ingredients. It was determined that shellac, which is acidic in nature, is not compatible with some of the alkaline materials which are customary ingredients in many rubber compounds. For instance, we found that the presence of any sizeable amount of strongly alkaline reclaimed rubber would not only retard but in most cases would prevent good cures, and that the use of alkaline accelerators exaggerated these poor results. Knowing the cause behind these unsatisfactory results, it was a simple matter to work out the proper balance of stock and acceleration, which has made possible the use of shellacs in a wide range of rubber products.

Advantages of Shellac are Manifold

A number of advantages are to be gained by the inclusion of shellac in rubber compounds, including the following:

(1) Shellac softens rubber during compounding operations and helps to wet filler, to cut power costs, and to produce denser, smoother mixtures.

(2) It improves flowing, extruding and calendering qualities.

(3) It aids molding operations, giving less porous stocks, with less shrinkage and better finishes in both soft and hard rubber.

(4) It improves aging and heat resistance.

(5) It increases abrasion resistance, especially when combined with added amounts of zinc oxide.

(Continued on page 274)

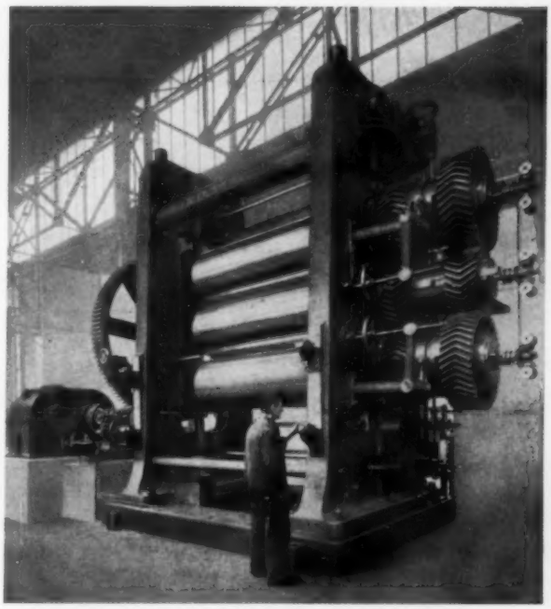
Eck "Universal" Calender

New 3-Roll Calender Eliminates Necessity of Cambering Rolls and Attains Uniformity with any Type of Compound

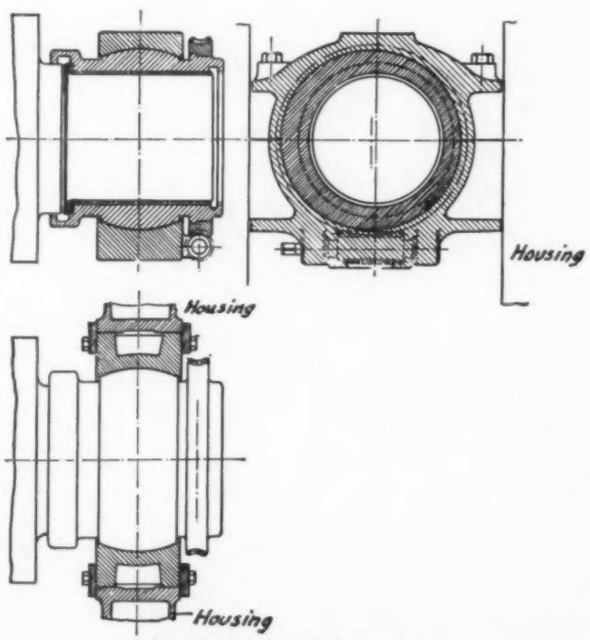
THEORETICALLY, all calender rolls are straight edged. These rolls are huge masses of metal, with the larger types ranging from 13 to 18 tons in weight. They are made of iron as a rule and when in the chilled state have a tendency to bend under pressure. Therefore, when operating under the pressure required for sheeting rubber there occurs a slight deflection of the roll when in contact with the rubber. Sometimes this deflection assumes serious proportions and what was originally a straight-edged roll becomes a curved roll.

It can be readily seen that once a calender roll becomes curved, no matter how slightly, the finished sheet will vary in thickness across its width. The wider the roll the more pronounced the variation. This tendency makes consistent uniformity practically impossible to attain. Then, too, it results in a certain amount of waste stock, which, over a twelve-month period, amounts to a considerable sum, particularly in view of the fact that large-scale calenders call for large-scale production.

Calender manufacturers have of course taken due cognizance of this curving problem and to date have partially rectified it by cambering their rolls, or, in other words, they grind the rolls with a modification of a straight edge so that when placed under pressure the line of contact with the material being processed is actually straight. The calender rolls are cambered so as to register uniformity of nip width accurately at a definite pressure with a definite stock.



Full view of the Eck "Universal" Calender.



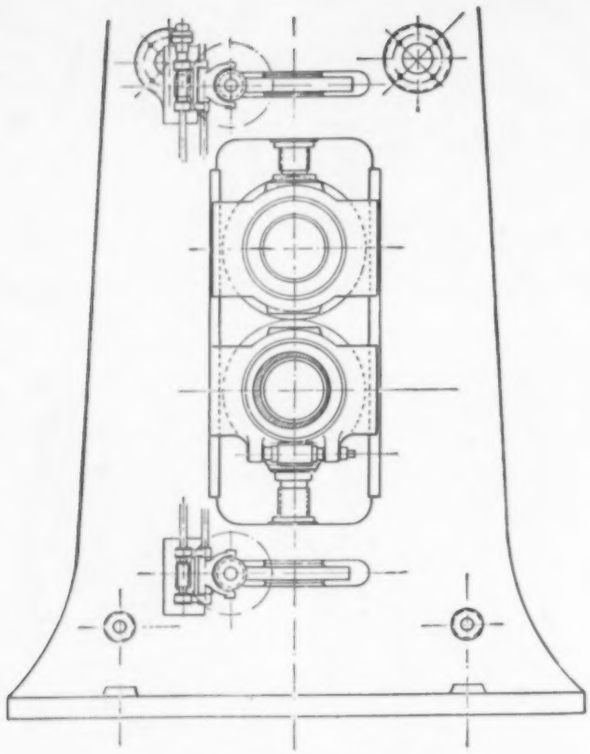
Schematic drawing of the bearings.

In other words, cambered calender rolls will give satisfactory results when the working pressure is the same as that when the roll was ground, and only when the same type of compounded stock is being processed. Therefore, the use of a calender roll in a rubber factory where a wide variation of products are manufactured is somewhat limited. Although the variation between handling a tire stock and a flooring stock may be very slight only, still the variation is often sufficient to destroy the uniformity of product every manufacturer continually strives to achieve.

Due to a new principle in design, a calender has recently been developed which is said to overcome previous limitations, one which may be successfully applied to the processing of all types of stocks without danger of the rolls tending to curve. This machine has been developed by the firm of Joseph Eck & Sohne, G.m.b.H., Dusseldorf, Germany. The new construction principle provides for positioning the rolls on the calender so that they can be run slightly off-center, *i.e.*, so that the axis of one roll crosses the axis of the other. This axial adjustment, under a given set of conditions, can be made smaller or larger so that a completely light-tight nip can be obtained throughout the entire width of the rolls.

In appearance, the new Eck Calender is orthodox in design. It has a massive, cast-iron frame capable of withstanding pressures of over 400 tons. The center

NOTE: Data for this article was taken from an article in the January, 1939, issue of *The Rubber Age* (of London), plus additional information furnished by Joseph Eck & Sohne, G.m.b.H., Dusseldorf, Germany.



Comparison between ordinary and Eck bearings.

roll is fixed so as to rotate in the usual manner, without deflection. The other two rolls run in very special bearings which enable them to compensate for deflection under pressure in the manner described. The successful action of the calender is attributed to the construction of these special bearings.

An ordinary cast-iron outer housing fits into guides in the frame of the calender in the usual manner and can be water-cooled in the normal way. Within the housing, however, there is a second, inner housing which has the special function of enabling the entire inner housing to be turned through 180°. The inner housing, by the action of turning, alters the position of the center of the shaft so that the axes of the rolls fall into an angle to one another. When pressure is applied, the rolls "wrap around each other." Actually, only the top or bottom roll moves out of position, since the center roll, as stated, is in a fixed position at all times. Because the distances involved are really so small the above description may give an exaggerated impression, but it indicates the action which occurs.

The internal portion of the bearing is not only

Diagram indicating action of the rolls.

"turnable", but can also swing in spherically-shaped trunnions so that the bearing is always self-aligning. This design is in distinct contrast to normal calender construction where the deflection of the rolls under pressure throws the ends of the shafts out of alignment. The "turning" of the eccentric internal portion of the bearings is performed by a small worm wheel which engages with a toothed ring on the inner bearing itself, the worm wheel being turned by a small key. The actual variation in setting is only a matter of millimeters, but this comparatively small movement is indicated by a pointer on a magnified scale, this mechanism giving the exact setting at any moment.

When the shafts are out of alignment it is obvious that some arrangement must be made for the true running of the gears situated on the ends of the shafts, and this is achieved by mounting the gears on a spherically-shaped setting which is a patented feature of the machine.

The chilled iron rolls on the Eck Calender are said to be made from castings having a uniform hardness of at least 500 Brinell. The surfaces of the rolls are finely ground and highly polished. The interiors are bored out to uniform wall thickness. Inside each roll is a bent pipe which sprays steam, hot water or cold water respectively on to the metal. The shape of the pipe prevents submersion of the apertures by condensed water, which is said to occur frequently with calender rolls of normal design.

All moving parts on the Eck Calender are said to be positioned exactly in their frames, thus obviating the use of wedges. The self-aligning bearings used result in a saving of power and less wear and tear on the machine. The adjustment for use at any pressure and with any compound is simple and quickly accomplished. Self-aligning gears, another patented feature of the calender, also contribute to its better performance. According to the manufacturer, the new three-roll calender may be employed for any purpose to which calenders are usually put and for processing any compound ordinarily used in rubber factories. Rubber manufacturers abroad now using the machine are reported to have stated that sheet made with it is uniform to a remarkable degree.

Shellac in Rubber

(Continued from page 272)

(6) It increases oil resistance properties.

(7) It improves electrical resistance properties.

(8) It gives better permeability tests in films and calendered goods.

(9) It increases hardness and toughness—the more shellac, the harder and tougher the product—but at the same time these harder, tougher stocks flow, extrude, and calender better than softer stocks with less or no shellac. In addition, the stiffness which shellac imparts is different from the loaded stiffness which is imparted by different kinds and amounts of fillers. We refer to this quality as a "live" stiffness.

(10) Although increasing hardness, shellac holds specific gravity low.

(11) It reduces tackiness and helps extruded goods, for instance, to hold gauge.

(12) In many compounds, the incorporation of shellac permits a reduction in the rubber content, naturally in proportion to the amount of shellac used.

It should be understood that shellac is an animal resin, not vegetable or synthetic. It is thermoplastic, extraordinarily free-flowing and ductile under heat, oil-proof, practically insoluble in all rubber solvents, and is non-oxidizing. It has a specific gravity of 1.15. In regard to cost, its price today is, and for a long time to come is likely to be, much less than that of smoked sheets, thus permitting compounders to base volume costs on a stable price structure.

Charles Goodyear

CONNECTICUT YANKEE AND RUBBER PIONEER

By P. W. Barker

CHAPTER XII

The Great India Rubber Case

ACCORDING to an estimate made in 1856, the vulcanization patent led to no less than one hundred and fifty suits, at law and equity, involving expenditures of at least $600,000. It can readily be seen, therefore, that Goodyear's rightful profits from his invention were dissipated in litigations. A number of these law suits, as already intimated, were between Charles Goodyear and Horace H. Day. In the long run they were to practically bankrupt both parties. It should be apparent that the winner might readily be the loser.

All Attempts at Peace Failed

Several members of the then embryonic rubber manufacturing industry had attempted to make peace between Goodyear and Day. Nathaniel Hayward was particularly persistent in this attempt, but without success. In fact, as previously recorded, Goodyear at one time was willing to pay Day the sum of $30,000 for his plant and put him out of the rubber business. But Day, apparently, wanted all or nothing. Had he not missed by only a few months in his endeavor to obtain the entire vulcanization patent which had taken ten years from Goodyear's life?

Day was an implacable foe. His manufacture of shirred goods without license caused Goodyear the loss of a license fee of $15,000 from David L. Suydam. The loss of this fee stirred the inventor to bring suit against Day. In fact, several suits were filed on different charges. Before any of the suits came to trial, Day asked for settlement out of court, promising to accept judgment in one suit, to pay $5,000 in damages and to further take an exclusive license on the manufacture of shirred goods for which he agreed to pay $10,000 in cash and a royalty of 3 cents a yard for all future goods made. He did accept judgment in one suit and paid damages of $5,000 as agreed, whereupon the inventor dropped the other suits.

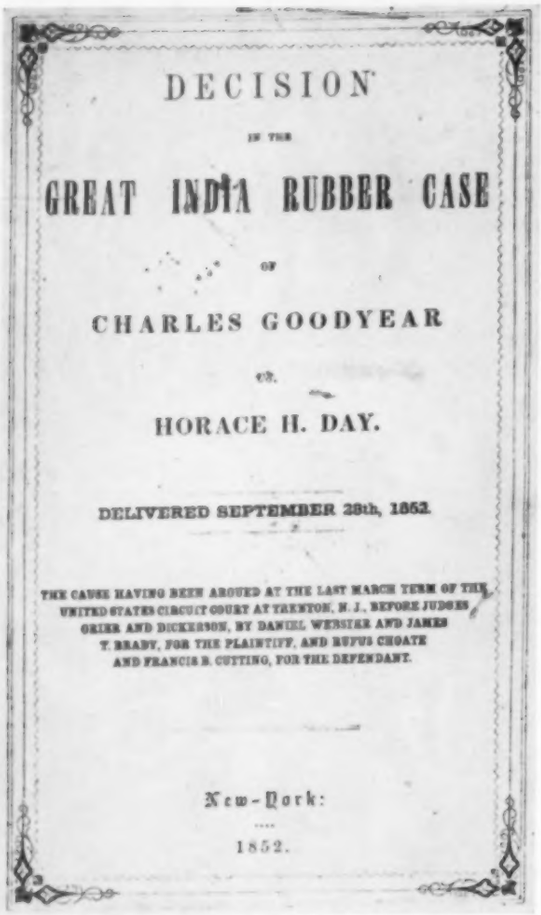
Immediately thereafter, however, Day began to manufacture a wide range of rubber goods in addition to shirred goods and generally infringed the vulcanization patent. He also began a newspaper advertising campaign in an attempt to discredit Goodyear and his licensees, and even petitioned Congress to declare Goodyear's patents void by reason of having been fraudulently obtained. (*See* Chapter X.)

There is little doubt that the charge of fraud finally aroused Goodyear to the point where he determined once and for all to get a court ruling on the validity of his vulcanization patent. This determination led to The Great India Rubber Case—Goodyear *vs* Day. Shortly after the suit was filed both Goodyear and Day began scouring the country for witnesses, taking depositions which might assist them at the forthcoming trial. Goodyear, the complainant, found 71 witnesses, while Day, the defendant, obtained 113.

Nathaniel Hayward was the star witness and gave his testimony in favor of the inventor, although Day did everything possible to secure Hayward's testimony for his own defense. Day's bitterness in losing Hayward's influence may be seen in the following excerpt from a letter he wrote to N. Hayward & Co., when he first learned of Hayward's decision to assist Goodyear: "From what I saw and heard of Hayward's operations, I infer that he has made all the benefit

> *We assert that Goodyear is the first man upon whose mind the idea ever flashed, or to whose intelligence the fact ever was disclosed, that by carrying heat to a certain height it would cease to render plastic the India Rubber, and begin to harden and metallize it. If there is a man in the world who found out that fact before Goodyear, who is he? Where is he? On what continent does he live? Who has heard of him? What books treat of him? What man, among all the men on earth, has seen him, known him, named him? I say that there is not in the world a human being that can stand up and say that it is his invention, except the man who is sitting at that table.*
>
> DANIEL WEBSTER, at Trenton, 1852

NOTE: This biography of Goodyear started in our April, 1938, issue.



DECISION

IN THE

GREAT INDIA RUBBER CASE

OF

CHARLES GOODYEAR

vs.

HORACE H. DAY.

DELIVERED SEPTEMBER 28th, 1852.

THE CAUSE HAVING BEEN ARGUED AT THE LAST MARCH TERM OF THE UNITED STATES CIRCUIT COURT AT TRENTON, N. J., BEFORE JUDGES GRIER AND DICKERSON, BY DANIEL WEBSTER AND JAMES T. BRADY, FOR THE PLAINTIFF, AND RUFUS CHOATE AND FRANCIS B. CUTTING, FOR THE DEFENDANT.

New-York:

1852.

Facsimile of the printed decision in the Great India Rubber Case, handed down by Judge Dickerson on September 28, 1852.

he could to Goodyear, and I would simply ask Nathaniel Hayward how he feels in the inner man. Mark what I write; you are cheated by your professed friends, but your aid to Goodyear shall not save him."

Deposition of Hayward was taken in Hartford, Conn., in the period between June 18 and July 11, 1851, and embraced 709 questions and answers, the printing of which required 92 pages of small type. All of the depositions were printed and bound in a volume of over 1300 pages which was read so earnestly and hopefully by Day that it was termed "Day's Bible."

With what reasoning Day could read his "Bible" and still believe he had any rights to the vulcanization patent will always remain a mystery. Furthermore, he had already admitted the validity of Goodyear's patent by accepting judgment and paying damages in one suit as recorded above. More than that, his witnesses did not have the respectability or experience in the rubber manufacturing art to equal those of his opponent. Hayward, Haynes, Haskins, Beers, Lovell, Strong, Stone, Newell, Armstrong, Coolidge, Professor Silliman—all good men and true—gave testimony for Goodyear.

A thorough and understanding reading of the depositions must have shown Day what a sharp business man he had become, one who certainly did not warrant the trust of his fellow man. It must have brought home to him how mean he had been in some of his recent dealings. There is only one explanation, of course, as to his actions, *i.e.*, that the man had hoped for so much from rubber that he actually believed himself to be the discoverer of the vulcanization process. He might have been a victim of self-hypnotism. He was to have a rude awakening.

Daniel Webster, James T. Brady and Edward N. Dickerson acted as counsel for Charles Goodyear, while Rufus Choate and Francis B. Cutting represented Horace H. Day. A number of additional legal advisers were also in attendance for each side.

It had not been a simple matter for Goodyear to obtain the services of the great Webster. Peter Harvey, member of Congress and personal friend of Webster, tells the story eloquently in his *Reminiscences and Anecdotes of Daniel Webster,* published in 1890. He says:

> "Mr. Webster was then Secretary of State, and no man occupying such a place had ever before taken a fee and gone into court. He was overworked and in feeble health. The labors of the State Department were heavy and severe; and when the proposition was made to him to go to New Jersey at that warm season of the year, to argue a case, it seemed almost an insult. I had seen Goodyear's agent, who told me that if Mr. Webster would argue the case, he would give him a check for ten thousand dollars, and if the case was decided in his favor, he would give five thousand dollars more."

Webster finally decided to accept Goodyear's offer, and Harvey records his answer thus: "This fee I must have, for it will pay fifteen thousand dollars of my debts, and that is what I am striving to do; it is what, if my life is spared, I mean to do. If I can pay my debts, I shall die in peace, a happy man." It would appear, therefore, that Daniel Webster actually received a fee of only $15,000, and not $25,000 as has been so often reported.

The Great India Rubber Case was heard by Judges Robert G. Grier and Philemon Dickerson of the Circuit Court of the United States, District of New Jersey, sitting in Trenton, N. J., during the May (1852) term. Mr. Webster arrived in Trenton on Saturday, March 20, three days before the court convened, and took quarters in the American Hotel. A chronological report of the trial follows herewith.

Chronological Record of the Trial

First Day, Tuesday, March 23: Brady opened the case for Goodyear. There was much discussion, participated in by Webster and Choate, regarding a jury desired by Day. The latter, through his attorneys, also demanded separate trials for his case in equity and his case in law. The court ruled that both cases should be heard simultaneously and immediately, without jury.

Second Day, Wednesday, March 24: Brady appeared for Goodyear throughout the session. (On this second day the court convened in the room of the Trenton County Court, which was capable of seating 700, the Circuit Court quarters having proved too small on the previous day to accommodate all of the distinguished persons—including many ladies—who had come down from New York to hear the case).

Third Day, Thursday, March 25: Brady for Goodyear all day.

Fourth Day, Friday, March 26: Choate for Day, 9:00 A.M. to 2:00 P.M.; Cutting for Day, 2:00 P.M. to 4:30 P.M. (At noon of this day Webster was greeted on the floor of the New Jersey Legislature, in joint session.)

Fifth Day, Saturday, March 27: Cutting for Day, entire session.

Sixth Day, Monday, March 29: Cutting for Day, entire session.

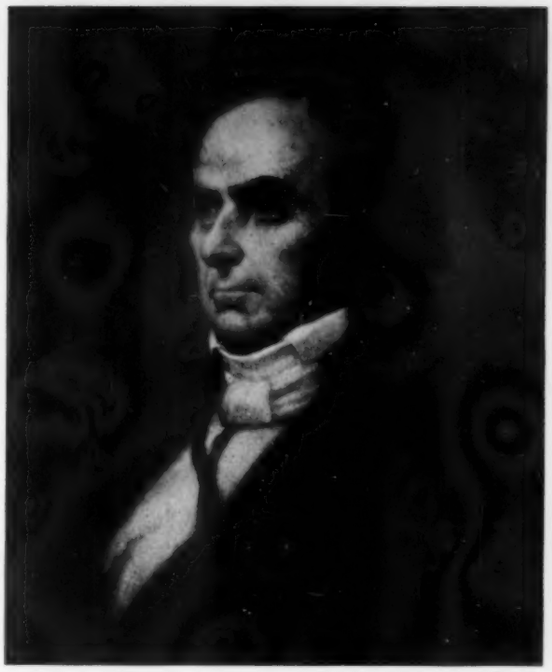
Seventh Day, Tuesday, March 30: Webster for Goodyear, entire session.

Eighth Day, Wednesday, March 31: Webster for Goodyear, closing at 2:30 P.M.

Little imagination is required to realize what a stir the appearance of Daniel Webster caused at Trenton. A contemporary newspaper, commenting on the crowds, said that one of its reporters had "stopped by" at 11:00 A.M. but had been unable to gain admittance. Reporters in those days evidently were very retiring creatures. Webster was probably at his best for he must have realized that this was to be his last appearance in a court room, and he needed that extra $5,000 promised him for victory. His lengthy speech was reported by Arthur Cannon, "Phonographic Reporter" of Philadelphia, and published in a pamphlet of 54 pages, containing an estimated 30,000 words. It was well done and bore throughout the genuine touch of the great lawyer and orator.

Goodyear was very solicitous of Webster's health during the trial, and each morning sent his servant with a carriage, pulled by a beautiful black horse, to convey Webster to the court. The statesman was returned to his hotel in the same manner every evening. Webster was a great admirer of horses and expressed his pleasure of the black horse which pulled the carriage. Goodyear made a mental note of this admiration which resulted in Webster's finding the horse in his stables at Marshfield, Mass., with the compliments of the inventor, many months later. Webster named the horse "Trenton", after the place of trial.

In his capacity as Secretary of State, and as a candidate for the Whig nomination for the presidency, Daniel Webster was invited to all manner of parties during his Trenton visit. He refused them all stating that his time was not his own but was devoted to the business on which he was engaged. He did attend the joint session of the New Jersey Legislature (as recorded), gathered to do him honor, where his bitterest political opponent in the state made him a courteous address of welcome.



Courtesy, U. S. National Museum

Oil portrait of Daniel Webster on hard rubber panel done by G. P. A. Healy in Paris in 1855.

L. Otto P. Meyer, hard rubber manufacturer and patentee, attended the trial and years afterward was enthusiastic regarding Webster. He wrote: "I assure you he was a giant in body and mind, with the physiognomy of a lion; his forehead and his eyes uncommonly large, the latter showing the grandeur of his soul." Referring to Goodyear, he said: "Charles Goodyear sat at the end of the court table where, to the right, Webster stood. Mr. Goodyear's face showed all of the suffering he had undergone."

Part of Webster's declamation was prophetic in nature: "I look to the time when this substance shall be applied to thousands of different uses! So that what he has now patented is but as dust in the balance compared with the uses not yet developed, and which shall be developed." Webster also paid a tremendous compliment to Mrs. Goodyear for her assistance to the inventor in his time of trial and poverty.

Horace Greeley and his *New York Tribune* did not think much of Goodyear's chances of winning, even with Webster. At the close of the trial he wrote: "The Great India Rubber Case is closed. Mr. Webster closed his argument this afternoon (March 31). Without doing any injustice to Mr. Webster we must say, it has fallen far short of our expectations. None of the great law points raised by Messrs. Cutting and Choate has been disturbed."

Despite the *Tribune's* pessimism, Goodyear and his associates indulged in a celebration. Meyer, quoted above, is quoted again: "From the courtroom many persons, including myself, went with Mr. Goodyear to his private room in the hotel, where he showed us beautiful samples of soft and hard rubber articles, of almost

(Continued on page 281)

LATEST DISCOVERY IN RUBBER— NEW RECEIPT—Get patent "honestly if you can, but get it." If other people make discoveries which renders your patent obsolete, useless, throw it up—take out another covering everybody's discovery—not necessary that you should be inventor, but swear strong—pay five, ten, even twenty thousand dollars to agents to get a re-issue; commence a dozen suits to annoy your neighbors. If defeated, try again, and again. If, in an interlocutory motion, your opponent is refused by the Judge get some name under which to publish, and boldly assert that your patent is sustained by the Court. Truth is not necessary under this new system, boldly assert that you have heavy suits, no matter if twelve or fifteen of the most eminent legal advisers in the country pronounce your re-issued patent a fraud, wholly illegal—no matter, you publish in newspapers that a decision is in your favor. It will also tend to soften the blow of a thorough Waterloo Jury Trial, verdict and judgment against you. If any of the deluded operators refuse to pay any further to the conspiracy fund, for carrying on the game before the public sue them—keep capitalists out of the business, and you will make a fortune, retire, and be perfectly respectable.

A single word of caution: don't fail to make the world believe your man is a great genius; use his name, but keep him always out of sight.

Nov. 4. HORACE H. DAY,

Manufacturer of India Rubber, 23 Courtlandt St.

Reproduction of one of a series of newspaper advertisements inserted by Day to discredit Goodyear and his associates. This one appeared in the November 6, 1850. issue of the *N. Y. Commercial Advertiser.*

Appellate Court's Decision In Vultex vs. Heveatex Suit

Circuit Court of Appeals Sustains Decision of the Lower Court but Holds that U. S. Patent No. 1,682,857 is Valid

ON April 23, 1937, Judge J. Brewster of the District Court of the United States, District of Massachusetts, handed down a decision in the suit brought by the Vultex Corporation of America against the Heveatex Corporation in which he declared that the claims made for the "hot vulcanization" of latex patent (No. 1,443,149) were valid but not infringed and the claims for the "cold vulcanization" of latex patent (No. 1,682,857) were invalid, but if valid were not infringed. Vultex appealed this decision to the U. S. Circuit Court of Appeals for the First Circuit which has just handed down its decision. This decision sustains the District Court in its ruling that claims made for the "hot vulcanization" patent are valid but not infringed and that claims made for the "cold vulcanization" patent are not infringed, but holds that this latter patent is valid. Because of the importance of this decision to users of latex, we are reproducing in full the ruling of the Appellate Court herewith.—Editor.

UNITED STATES CIRCUIT COURT OF APPEALS
FOR THE FIRST CIRCUIT
(October Term, 1938. No. 3315)

VULTEX CORPORATION OF AMERICA, ET AL.,
Plaintiffs-Appellants
v.
HEVEATEX CORPORATION, ET AL.,
Defendants-Appellees

Appeal from the District Court of the United States for the District of Massachusetts.

Before:
WILSON, MORTON AND PETERS, JJ.
Circuit Judges

OPINION OF THE COURT
January 10, 1939

WILSON, J. This is an appeal from a decree of the District Court of Massachusetts dismissing two bills of complaint which were tried together. The two cases have been consolidated on appeal. Both cases involve processes for vulcanizing the rubber particles in suspension in the milky sap of the rubber tree, which is known as latex. The crude rubber of commerce is obtained by coagulating or separating the solid rubber particles from the latex.

The two patents in suit describe processes for vulcanizing the rubber particles in suspension in the latex and before coagulation. Prior to the patents in suit there were two processes used in vulcanizing rubber known in the art as "hot vulcanization" and "cold vulcanization."

"Hot" and "Cold" Vulcanization

In general, in "hot vulcanization" certain well-known vulcanizing ingredients, sulphur and certain accelerators, were incorporated into a mass of crude dry rubber by a milling operation, and the mass subjected to heat above the boiling point of water and under pressure.

In "cold vulcanization" there was incorporated into the mass of crude dry rubber sulphur what were termed organic accelerators of a kind which brought about vulcanization at a temperature below that of boiling water. Such accelerators are termed "high power" accelerators or "low temperature" accelerators, and require only a relatively low degree of heat, without pressure, to vulcanize the crude rubber.

Claims Made by the Plaintiff

Under the first patent in suit, No. 1,443,149, issued to Dr. Phillip Schidrowitz in 1923, on an application filed in February, 1922, it is claimed that he discovered that it is possible to vulcanize rubber in the liquid latex without coagulation or separation into crude rubber.

Under the second patent in suit, No. 1,682,857, issued to Dr. Schidrowitz in 1928, on an application filed in March, 1923, it is claimed that the discrete particles of rubber, which are separated in the latex from each other by water, may be caused to combine with the sulphur, which is not soluble in water, and at temperatures below the melting point of sulphur. He discovered that the sulphur penetrates the outer shell of the discrete rubber particles in suspension in the liquid latex, and with the aid of "low temperature" accelerators vulcanizes the contents at temperatures below the boiling point of water.

It is apparent from the specifications of the Letters Patent and in general from the description of the processes involved in the two patents in issue, that the first patent in suit proposed vulcanization of the particles of rubber suspended in the latex by the "hot vulcanization" process, and the second patent in suit proposes to accomplish vulcanization by what is termed a "cold vulcanization" process.

Each method in the respective patents in suit differs from the method in use prior to Dr. Schidrowitz's alleged discoveries, in that the vulcanizing ingredients act upon the rubber particles in suspension in the liquid latex instead of upon the rubber particles after coagulation or separation from the latex in the form of dry milled crude rubber.

The first case involves claims 8, 9, 19 and 20 of Letters Patent No. 1,443,149; and the second case involves claims 7, 8, 12 and 16 of Letters Patent No. 1,682,857—all process claims. The District Judge held that as to the patent No. 1,443,149, the claims were valid but not infringed; and in the second patent, No. 1,682,857, that the claims were not valid, but, if valid, were not infringed.

We think the ruling of the District Judge was correct on the evidence that there was no infringement of patent No. 1,443,149, there being no evidence that the defendants did anything more than compound the liquid latex with sulphur and certain accelerators, but did not subject the compound to heat or pressure or to any of the vulcanizing steps described in the first Schidrowitz patent in issue.

The plaintiffs also sell a compounded latex under the name of "Vultex." It is understood in case of the sale of this compound, and in case of the compound customarily sold by the defendants in commercial quantities, that the customer would take necessary steps to bring about the vulcanization of the rubber in suspension in the latex to the degree required for his particular use.

In fact, the plaintiffs make no claim now that the method used by the defendants in their general commercial practice

of selling freshly mixed unvulcanized latices, which must be subjected to a vulcanizing operation by its customers after coagulation by the user, infringes either of the patents.

The plaintiffs in their brief to this court say:

"The usual practice of Heveatex Corporation in selling 'Formula C' and Type 'IC' is to mix the ingredients on receipt of an order and to ship the compounded latex promptly. It is the usual practice of users, who order fortnightly, to vulcanize the rubber obtained from the latices by coagulation. This is not the practice complained of.

"The acts complained of were the shipments of latex substantially vulcanized when they left the place of business of the defendant, Heveatex Corporation. This and this only is the infringement complained of."

Specific Infringement Charges

The infringement complained of, therefore, is confined to the sale of three small sample lots of compounded latex procured of the defendants by certain of the regular customers of the plaintiffs in May, June, and July, 1934, respectively. These sample lots consisted of a five gallon can of what the defendants designate as "Formula C," a one gallon can of the same formula (with the addition of certain inert coloring and filling materials), and a one gallon can of so-called "IC Compound." The first was shipped to the Lee Hardware Company at Salina, Kansas; the second to the Tyer Rubber Company at Andover, Massachusetts; and the third to the Anderson Manufacturing Company at Cambridge, Massachusetts.

It should be borne in mind that these samples were supplied ostensibly to be tested and treated by the customers to determine whether suitable for their respective uses, and were not supposed to be typical of the products of the defendants sold in their general commercial practice. These samples were not subjected to heat or any other vulcanizing steps by the defendants before shipment.

The samples ordered were not in sufficient quantity to warrant their being made up for supplying the particular order and for immediate shipment thereafter, as would occur in practice, in case of an ordinary order for a considerable quantity.

In general, the procedure indicated in the second Schidrowitz patent No. 1,682,857, differs from the procedure set forth in the first Schidrowitz patent No. 1,443,149, in the same way that the so-called "cold vulcanization" process, when applied to crude rubber, differs from the so-called "hot vulcanization" process applied to crude rubber.

It is conceded that latex, when compounded with sulphur, an accelerator, and activator like zinc oxide, may undergo changes even at room temperature and after a time may show incipient vulcanization.

If these samples infringed either of the Schidrowitz patents, it must have been the second patent, since no heat was applied by the defendants nor any other vulcanizing steps taken before shipment. Therefore, upon this record, any vulcanizing that occurred must have been due to the age of the mixture or the temperature to which it may have been subjected in transit, and not to any intentional act of the defendants.

The District Court held that claims 8, 9, 19 and 20 of the second Schidrowitz patent were not valid, as the same process was covered by the claims of the first patent, and that the mixing with latex, sulphur, zinc oxide and certain "ultra accelerators" or "low temperature accelerators," such as piperidine or a derivative thereof, known in the art as "pip-pip," was in common use in the prior art upon milled crude rubber, and it did not disclose invention to apply the same process to latex.

It is suggested also that he might have taken the ground that, since the specifications and claims of the first patent stated that vulcanization of the latex might be accomplished by any other method than that described in the claims of the first patent, and as the invention, according to the specifications, is not restricted to any particular method of vulcanization, the second process was covered in the first patent and for this reason was invalid.

The art of vulcanizing rubber is not a mechanical process, the result of which can be determined within a definite degree of certainty, but is an empirical process. It could only be reached by experiment. The chemical changes in rubber when vulcanized, or the action of sulphur when combined with it, are not understood. If the application of what is known as "hot vulcanization" in the case of crude rubber when applied to latex results in the vulcanization of the particles of rubber in suspension in the watery latex after the application of heat, it does not necessarily follow that a compound of latex with zinc oxide and a "low temperature" accelerator without the application of heat or pressure would result in the vulcanization of the rubber particles in suspension in the liquid latex.

We think that the discovery of this by Dr. Schidrowitz by experimentation was a step in advance over the prior art, and also the so-called "hot vulcanization" discovered by Schidrowitz as applied to latex, and disclosed in the first patent in issue, and that the second patent was valid.

The vulcanization of crude rubber by the hot and cold method had been in use for nearly seventy years and no one before Schidrowitz had discovered that substantially the same processes, with some modifications, could be applied to latex before coagulation. This may in part have been due to the inability in this country readily to obtain a supply of latex for experimentation. At least, many of the authorities on vulcanization of rubber give credit to Schidrowitz for making the discoveries set forth in the two patents in suit.

But, assuming that the second Schidrowitz patent discloses a patentable invention, it is strenuously urged by the defendants' counsel that the samples supplied to the Lee Hardware Company, the Anderson Manufacturing Company and the Tyer Rubber Company did not constitute infringement of either of the patents in suit.

As already pointed out, there was clearly no infringement of the first Schidrowitz patent. The samples were at no time subjected to heat or pressure before leaving the defendants' plant. Apparently the cases hinge on the proper definition of vulcanization as used commercially and in the art.

The defendants claim and support their contention by quoting from Dr. Schidrowitz's testimony in the record to the effect, as they claim, that commercially and in the art, vulcanization is a state produced in a particular compound, in which no further changes occur. In other words, while vulcanization is a progressive change in the character of the material, it is not until it is vulcanized as a finished product for a particular use, in which case no further change takes place, that commercially it is termed vulcanized.

Cite Schidrowitz's Testimony

In answer to a question by defendants' attorney Dr. Schidrowitz testified as follows:

"*X-Q.* Vulcanization is a step which fixes the characteristics of the finished product as regards these characteristics?" Dr. Schidrowitz answered: "Yes,—broadly, yes."

Again, in answer to the following question:

"*X-Q.* When you get a vulcanized product, a vulcanized piece of rubber, during the course of time is its quality constant if you get a properly vulcanized piece of rubber?" He answered without qualification, "Yes."

Variations in the vulcanizing procedure can be controlled and predetermined by the conditions under which the vulcanizing steps are performed; but in all cases in a vulcanized product as understood commercially, the characteristics of the finished product are fixed finally and no further change takes place. Its characteristics are fixed and stable for the purposes for which it is to be used.

Omansky, plaintiffs' expert tester, in defining vulcanization —though his experience in working with latex appears to have been limited—testified:

"*X-Q.* Will you just, very briefly, define what vulcanization is, what you mean by that, what vulcanization means in the industry? *A.* In the industry vulcanization means that the result of the reaction with sulphur, the physical properties of rubber are changed so that the resulting rubber, dry rubber, depending on its source, is no longer sensitive to temperature changes."

Again, he defined vulcanized latex in his testimony as follows:

"*X-Q.* Now, the reaction which takes place in connection with the vulcanization of latex is the same in nature as that

which takes place in the vulcanization of crude rubber, or a very dry rubber mix, is it? *A.* It is the same in principle but it differs in detail.

"*X-Q.* It takes the form of a chemical reaction of some unknown sort between the sulphur and the rubber particles, with resulting changes in the physical condition of the rubber particles? *A.* That is right.

"*X-Q.* I would like to have you define what you mean by vulcanized latex. *A. It is one where the rubber particle in the latex has combined with sulphur to an extent sufficient to permanently change the rubber so that it is more resistant to solvents, so that it has obtained an elasticity at the expense of plasticity, so that the dry film, or the coagulum with the water removed, resembles the properties of vulcanized rubber,—the desirable physical properties of vulcanized rubber.* (Italics supplied).

"*X-Q.* Such vulcanized latex requires no further heat treatment on the drying of the film? *A.* It need not require any further heat treatment."

Omansky's Testimony on Vulcanization

His views are further explained in the record as follows:

"*X-Q.* That is, in the case of the Lee sample, at the time of your first analysis of it, it was partially vulcanized? Is that right? *A.* You can call it that if you want to.

"*X-Q.* Partially vulcanized? And upon standing a while longer it became what you call completely vulcanized? *A.* I did not call it partly or completely; I called it completely at the start.

"*X-Q.* All right. At any rate, if it was completed at the start it could not have been more complete later on, could it? *A.* Yes, it is a very common term in the industry—over-vulcanized.

"*X-Q.* All right. Then there was a progressive change from what you would call a complete vulcanizing to an even more complete vulcanizing, which you call an over-vulcanization? *A.* I cannot accept the term 'more complete.'

"*X-Q.* Neither can I, Mr. Omansky, and that is why I wondered why you could say that the first sample was completely vulcanized and then that it was more vulcanized later on. Now I would like to have you explain to the court what you meant by that. *A.* Vulcanization is a progressive step. I think, as I mentioned in direct testimony, it can go on from a small percentage of sulphur to produce certain very desirable results, as in surgeon's gloves, steam hose, air hose, and the tubes intended for use in truck and bus tires. That vulcanization can progress further to produce a condition of rubber which is more suitable for resistance to abrasion such as you find in the treads of automobile tires. That process can continue still further to produce materials which do not require so much flexibility but get more scratching than a tire, such as a rubber heel. That process can continue still further until you have as much as 25 to 35 per cent of sulphur combined with the rubber, until we get what you call artificial whale bone. The process can again continue still further until you get a hard rubber, such as in radio panels and battery boxes. So that partial vulcanization, or complete vulcanization, does not mean that you have to carry it on until no more sulphur is there. It means, until you have reached the stage where the rubber possesses the desired properties for its intended use.

"*X-Q.* For this particular use? *A.* Yes.

"*X-Q.* Well, at any rate, the evidence that you got from these samples is that the longer they stand the more the degree of vulcanization progresses? *A.* Yes, that is true."

Evidently the defendants' samples were not vulcanized latex, nor do the defendants use any process that produces a vulcanized latex as that term is used commercially or in the art. An essential characteristic of a vulcanized product, commercially and in the art, whether crude rubber or rubber particles suspended in latex, is whether by the treatment they received they have acquired fixed and determined characteristics for a certain use which do not materially change with the lapse of time.

The District Court evidently accepted this definition. It is clear that none of the three samples, which it is contended infringe the second patent in suit, were vulcanized within this definition. The state of vulcanization of each sample, even if the plaintiffs' expert testimony is accepted at its face value, was progressive, the characteristics of each sample were not fixed beyond further change when received by the customer.

Whether Omansky made more than one test of the Tyer sample or not, he testified that it was not so completely vulcanized as the Anderson sample, and that the state of vulcanization of the Anderson sample on a second later test proved to be progressive. It follows, therefore, that the Tyer sample, on a later test for the degree of vulcanization, would also have proved it to be progressive. Their condition in any event was not due to any action by either of the defendants, but was obviously due to age or the temperature to which they had been subjected after shipment.

In particular, the sample supplied to the Lee Hardware Company in May, 1936, was shipped to Kansas and then, without being opened, it was reshipped to the plaintiffs' expert at Cambridge, Massachusetts. It was in transit twelve days in the heat of early summer. It would be a miracle if vulcanization had not then progressed to a point where an expert, on application of certain tests, could not detect some degree of vulcanization.

The compounded latices of the defendants had not acquired that fixed characteristic of a vulcanized product. On the contrary the qualities of its compounded latex changed progressively with time, even at room temperature. Heat treatment to be applied by the customer to the coagulated product made from the latex of the defendants would be required to vulcanize and fix and stabilize the qualities of the product.

It is a significant fact, although each of the three parties ordering these samples wrote the defendants to the effect that they were desired for a specific use in their business, yet on receipt of the samples, without being opened, they were immediately shipped to the plaintiffs' expert for testing as to vulcanization and not to determine whether they were suitable for the use specified.

There is no evidence that either of the companies ordering the samples ever learned of the result of the tests by Mr. Omansky; nor were the defendants ever notified that the plaintiffs relied in their suits upon any sample except the five gallon lot shipped to Kansas and from Kansas to Massachusetts until two days before the trial. Neither did the defendants have access to the samples for testing or for cross-examination of plaintiffs' experts until two years after they were delivered, when such tests were futile.

We do not think the letter of the Lee Hardware Company to the defendants that what they desired was an article that would require no heat treatment, only quick drying, necessarily indicated a vulcanized product. Several of the samples had had no heat application, yet Omansky testified they were "completely vulcanized."

Court Holds Samples of Uncertain Age

In each case it is evident that the samples were of uncertain age when shipped. They were not sold as typical of the commercial product of the defendants, which the plaintiffs admit does not infringe. They were supplied to determine whether the defendants could furnish a product which, if treated by the customer in the customary manner, would meet certain particular needs of the customer. However, the samples clearly were not obtained for that purpose, but to obtain, if possible, evidence of infringement.

While technically there was evidence of vulcanization to a certain degree, it was not evidence of a final and complete vulcanization such as would fix the characteristics of the sample for a particular use. To hold that there was infringement upon this testimony would give the plaintiffs a monopoly that the patent statute does not contemplate, since the use of such compounded mixtures by a customer who treated it to secure vulcanization to a degree suitable for his purpose, would be liable to a claim of infringement.

It would be impossible to make up a compound that, before being used by a customer, might not show evidence of progressive vulcanization and subject either the seller or the buyer to a suit for infringement. This accidental incomplete vulcanization of a *compounded* latex is not covered by the patent which clearly contemplates a vulcanization which is complete although it may be light. The District Judge found,

adopting the defendants' argument, that "defendant's product is not a vulcanized latex nor does defendant use any process which produces a vulcanized latex."

In view of the conflicting testimony we cannot say that this finding was clearly wrong. The contrary view brings within the scope of the patent compounds which had been in use before the date of the application.

The testimony of the officials of the Lee Hardware Company is at variance with Mr. Omansky's testimony. The officials of the Lee Hardware Company in their correspondence at some length stress the purpose for which it desired the sample, *viz;* for binding and tabbing, and wrote the defendants that the sample was not suitable for that purpose; yet Omansky testified that it was vulcanized to just the point to make it desirable for that purpose.

Testimony on the Lee Sample

On this point Omansky testified as follows:

"*Q.* Now, Mr. Omansky, you testified that you performed a chloroform test on this material on the day it was received, and it indicated, it showed a Class 2 coagulum. Were you able to base any opinion, as the result of that test, of the presence or absence of vulcanization in that material before it was coagulated? I am speaking of the Lee material. *A.* In the Class 2 test it showed that the material was vulcanized.

"*Q.* To what extent for tabbing, bookbinding purposes? *A.* To the extent that is most desirable for tabbing and bookbinding purposes.

"*Q.* Will you state whether or not any further vulcanization after coagulation would be desirable or undesirable? *A.* Further vulcanization of the rubber for its specified use would be undesirable.

"*Q.* Further vulcanization after coagulation? *A.* Yes.

"*Q.* Now I understand it is your opinion that this material on the day you received it, was vulcanized and completed for tabbing and bookbinding purposes? *A.* Yes.

"*Q.* You base that on the chloroform test? *A.* I do, and on the knowledge of what bookbinding requires.

"*Q.* And tabbing? *A.* And tabbing, too."

How the Lee Hardware Company discovered it was not suitable for that purpose is not clear, since the five gallon sample was immediately shipped back to Massachusetts as soon as received without being opened. If they received back from Omansky a sample of the shipment on May 29, 1934, it was some time after it was originally received from the defendant corporation.

Both Vultex Patents Held Valid

The District Court found that the samples did not show vulcanization within the meaning of the art, to the extent that constituted infringement.

An analysis of the expert testimony pro and con would serve no useful purpose in an opinion. It is of the customary character of expert evidence and carries no great weight owing to its vague and contradictory nature.

Since there was not sufficient evidence of infringement by the defendant corporation, it is not necessary to discuss whether on the evidence the president and general manager of the defendant corporation is also liable. In any event, there is not sufficient evidence in the record to warrant holding him, as an officer of the defendant corporation, liable for infringement under the test laid down in such cases in *Schiff* v. *Hammond Clock Co.*, 69 Fed. (2nd) 742,745.

We think the District Court erred in holding that the second patent in suit disclosed no invention over the first or over the prior art. The second patent being held valid but not infringed the decrees of the District Court should be affirmed.

The decrees of the District Court dismissing the bills are affirmed with costs.

Have you reserved space yet in the 1939 RUBBER RED BOOK? More than fifty pages have already been contracted for and several of the preferred positions taken. If you want the benefit of good space we urge you to make an immediate reservation.

Charles Goodyear—Connecticut Yankee

(Continued from page 277)

everything makeable of rubber. On that memorable day nearly all the principal men interested in the Goodyear patent sat at dinner with him, my friend Conrad Poppenhusen and I sitting together. Joy reigned all around, tuned high by champagne." Day and his party likewise celebrated at another Trenton hotel in their hope for ultimate victory and complete exoneration of all infringement charges.

On September 28, 1852, decision in The Great India Rubber Case was handed down in Trenton. It was a sweeping victory for Charles Goodyear and his vulcanization patent. Judge Dickerson ruled that he was entirely satisfied that Goodyear was the original inventor of the process of vulcanization and decreed that he was entitled to the relief he asked as well as to the merits and benefits of the discovery. Permanent injunction restraining Day from further infringement of the patent was granted. A referee was appointed and Day was ordered to make an accounting with a view to paying damages.

Local Trenton papers did not agree with the decision, probably because it affected home industry. One wrote: "Mr. Day has the sympathies of the community despite the judicial ban under which he labors. Our kindest wishes ever attend him—as the friend of the distressed and the indomitable advocate of the right of the honest mechanic." (*Weekly True American*, Trenton, October 1, 1852).

Goodyear and Licensees Called Scoundrels

The February, 1856, issue of *Hunt's Merchants' Magazine and Commercial Review*, of New York, reviewed the litigation and was considerably distressed over Day's defeat in 1852. According to the article, Goodyear and his licensees were scoundrels of the worst kind. This article tells how Day managed to evade the decision of the court with regard to the payment of damages by selling his plant before the date of the decision and moving from New Jersey. He was brought back to Trenton, however, on a charge of contempt of court which was sustained. Day again left the jurisdiction of the court and managed to escape the decree of judgment by one maneuver after another. He will be heard from again when Goodyear seeks extension of his vulcanization patent.

Less than a month after the decision had been handed down in The Great India Rubber Case, Daniel Webster was dead. The great statesman, orator, lawyer and Secretary of State died on October 24, 1852. It is said that the loss of the Whig nomination for president hastened his death. Seventy years of living life at its height, with the majority devoted to public service, however, was more likely the real cause of death. Webster had returned home in July, after the rubber case, and a holiday in Boston was declared in his honor. Immense crowds listened to public addresses and witnessed the firing of cannon.

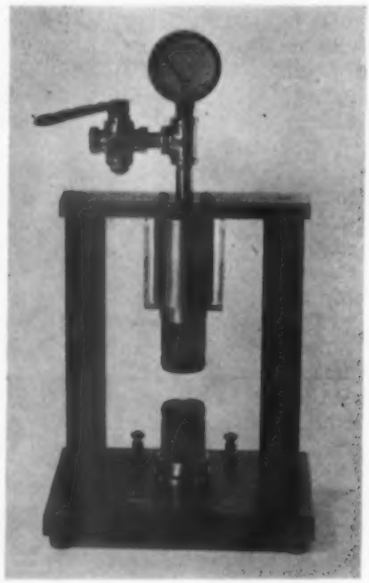
Rufus Choate, opposing counsel in his last suit, attended Webster's funeral and made the eulogy which has since become famous. More than 10,000 people attended the burial at Marshfield, and 50,000 visitors were in Boston without hope of attending the ceremonies. Daniel Webster lived long enough to know that his last case before the bar of justice was a victory for the right, and almost his last words were concerned with "Trenton," the beautiful black horse given to him by Charles Goodyear.

(To Be Continued)

New Equipment

Mico Tape Tester

DESIGNED for testing the dielectric strength of cable splicing and similar insulating materials, a new tape tester has been introduced by the Mico Instrument Company, 10 Arrow Street, Cambridge, Mass.



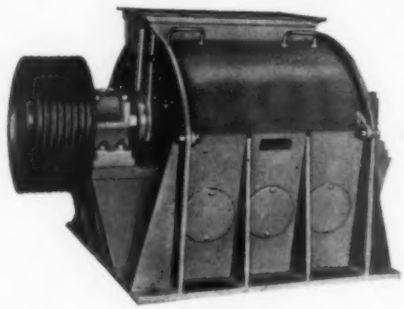
The design of the new unit is a modification of the one by R. W. Chadbourn of the Boston Edison Company. An ingenious arrangement of electrodes permits clamping the tape or other flat insulating material being tested firmly without undue stretch or wrinkles and also permits the application of electrodes in firm contact with the sample. The electrodes center themselves with ample clearance for the escape of gases at the moment of breakdown. An air cylinder supplies the necessary clamping, springs separating the electrodes as the air pressure is released. A three-way valve permits blowing water out of the air line, admits air to the cylinder, and connects the cylinder to atmosphere. A pressure gauge is also provided. All metal parts are chromium plated. An air supply of 30 to 50 pounds is needed to operate the new testing device.

Colalloy

COLALLOY, a new non-ferrous silvery metal, the properties of which lend themselves to the construction of various special apparatus in a wide number of industries, including that of rubber, textiles and chemicals, is now being produced by the Colonial Alloys Co., Philadelphia, Penna. The new metal is said to be two-thirds lighter than steel, unusually resistant to corrosion, outstanding in electrical and thermal conductivity, and low in cost. Its salts are colorless, odorless, non-toxic, tasteless and non-contaminating. It has a range of hardnesses, tensiles, working factors, and other properties which make it an all-purpose metal. Although the natural appearance of Colalloy is silvery, it is also available in other surface effects.

Giant Rotary Knife Cutter

AN extra heavy duty all steel rotary knife cutter, which is said to offer a new and better production method to processors having difficult granulating, shredding, flocking, stemming or reduction problems involving a minimum production of fines or control of



finished product size, has been developed by Sprout, Waldron & Co., Muncy, Penna. The patented top and bottom screen construction of the new cutter, combined with the special knife placement which permits only two knives to be in shear at one time, is said to not only result in a gradual reduction cutting and screening action to desired size with a minimum production of fines, but to also result in less vibration due to shock loads, smoother operation, lowest power requirements and longer screen life. Screen area of the new machine is practically three times that of standard cutters. The sides are hinged for quick and easy access into the machine, the interior of which is free from ledges, shelves or obstructions so that cleaning can be accomplished with little effort and loss of time. Every knife is adjustable and screen changes are quickly made.

Tagliabue "9" Recorders

A NEW line of "9" Recorders and Recorder-Controllers for temperature and pressure, occupying half the space but including every feature of the larger 10 and 12-inch recorders, has been introduced by the C. J. Tagliabue Manufacturing Co., Park and Nostrand Avenues, Brooklyn, N. Y. The new recorders

have a full-size 9-inch chart with a 3 15/16-inch pen travel. By compact arrangement in a small case, finished in black enamel and chromium, the new instruments contain every feature found in the standard recorders, including the interchangeable tube system, pen arm bracket supported by bearings at both ends, positive micrometer pen adjustment, safety link for range protection, convenient chart holders, etc.

Book Reviews

Soilless Growth of Plants. By Carleton Ellis and Miller W. Swaney. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York City. 6 x 9 in. 156 pp. $2.75.

(Available from *Book Department,* THE RUBBER AGE)

Although this book carries no information of industrial import to rubber chemists or technologists, it is of interest to every member of the rubber industry with an interest in gardening, particularly of the home-growing variety. It has long been known that plants will grow without soil. This book is the first popular discussion, however, of growing plants in sand, cinders and other materials. It is based on numerous laboratory tests and investigations, and repudiates some of the widely circulated, but erroneous, claims made for soilless-growth practices. The authors feel their way cautiously and frankly invite correspondence from readers concerning novel set-ups covering methods of soilless growth. The book is exceptionally well printed and contains a number of beautifully colored illustrations.

•

The Chemical Formulary. (Vol. IV). Edited by H. Bennett. Published by Chemical Publishing Co. of N. Y., Inc., 148 Lafayette St., New York City. 5½ x 8½ in. 632 pp. $6.00.

New and additional formulae gathered since publication of the third volume of this book accumulated in such a quantity as to warrant the issuance of this, the fourth volume. Not only does this latest edition incorporate hundreds of additional formulas, but because many purchasers of the book are beginners in the art of chemical compounding an explanatory introductory chapter has been included. This chapter explains the purpose of the "Formulary" and gives complete directions for making simple preparations which are in everyday use. Like previous editions, the book is both a time and work saver for technical workers, instructors and chemists. It includes formulas for a number of latex and rubber products.

Booklets, Catalogs, etc.

Trade Agreement Between the United States and the United Kingdom. (Vol. 8). United States Tariff Commission, Old Land Office Building, Washington, D. C. 6½ x 9¾ in. 230 pp.

This report, which consists of digests of trade data with respect to all types of sundries on which concessions were granted by the United States to the United Kingdom, should prove of special interest to every rubber manufacturer, importer and exporter. It is one of a series of eight volumes prepared by the Tariff Commission. Data is given on golf balls, toys, hard rubber manufactures (except syringes) and other rubber products. In addition, there is an introductory chapter which contains an analysis of the entire agreement. Copies of this report are being distributed by the Government without cost.

•

Effect of Light on Unvulcanized Rubber. By J. T. Blake and P. L. Bruce. Simplex Wire & Cable Co., Cambridge, Mass. 7¼ x 9¾ in. 12 pp.

This booklet, a reprint of the paper delivered by the authors at the Rubber Technology Conference held in London last May, and which is part of the printed "Proceedings," contains the results of tests conducted to determine the effect of light on unvulcanized rubber. According to the authors, the results should have an important influence on our theories of the action of anti-oxidants and, perhaps, bring more emphasis on the distinction drawn by Dufraisse between anti-oxidants and anti-oxygens.

The System Latex-Colloidal Clay. II. Further Investigations on the Influence of Colloidal Clay in Rubber. By A. Van Rossem and J. A. Plaizier. Rubber Foundation, Heerengracht 182, Amsterdam, Holland. 6 x 9½ in. 22 pp. (A limited number of copies are available from THE RUBBER AGE).

This booklet is a reprint of the paper delivered by the authors at the Rubber Technology Conference, held in London, England, last May, reproduced from the "Proceedings" of the Conference by permission of the publishers. As the title indicates, the authors discuss laboratory investigations of the addition of bentonite to rubber and give data on the performance characteristics of latex-colloidal clay compounds. Discussion on this subject held at the Conference is included in the booklet.

•

Uses and Possibilities of Rubber in Agriculture. By Alexander Hay. British Rubber Publicity Association, 19 Fenchurch St., London, E.C. 3, England. 5½x8½ in. 28 pp.

This bulletin, the eighth in the "Rubber and Agriculture" series sponsored by the British Rubber Publicity Association, affiliated with the International Rubber Regulation Committee, is a reprint of the paper presented by Mr. Hay at the Rubber Technology Conference held in London last May. The various uses of rubber on the farm and in the dairy are briefly described, with many being illustrated. A bibliography is included.

•

Natural Laws Applied to Production. (Revised Edition). Mathews Conveyor Co., Ellwood City, Penna. 8½ x 11 in. 32 pp.

This booklet, which shows how modern industrial organization is based on the principle of continuous flow, has been revised to the extent of making it more easily understood by the layman. In this direction, a number of simple illustrations have been included which explain pictorially the various terms used to describe different types of conveyors in relation to movement. As in previous editions, the subject of continuous flow is covered from principles to basic elements.

•

Tag Dial-Indicating Thermometers. (Catalog No. 1170). C. J. Tagliabue Mfg. Co., Park and Nostrand Avenues, Brooklyn, N. Y. 8½ x 11 in. 20 pp.

The complete line of standard dial-indicating thermometers, which embody the same construction and operate according to the same principles that insure sensitiveness, accuracy and durability in the company's recording thermometers, is described and illustrated in this catalog. Full specifications are included. A number of industrial installations are shown pictorially. The catalog also includes descriptions of numerous accessories.

•

Chemicals by Glyco. Glyco Products Co., Inc., 148 Lafayette St., New York City. 5½x8½ in. 64 pp.

This latest edition of the Glyco catalog contains a number of additional features. It has a complete index of products, formulae and uses which simplifies locating particular pieces of information. A number of new products are also described in the catalog in addition to the company's complete line of esters, emulsifying agents, synthetic waxes, resins, etc.

•

How to Cut Tire Cost Per Truck Mile. Bibb Manufacturing Co., Macon, Georgia. 5¼x7¾ in. 24 pp.

Primarily written for the buyer and user of tires for the transportation of pay loads, this booklet tells the complete story of the Bibb Heat Resistant Cord (covered by U. S. Patent 2,103,218). Results of various tests between tires made with ordinary cord and those from Heat Resistant cord are given. Comments from various fleet owners are also given. Economies to fleet owners resulting from the use of tires made with the new cord are stressed.

Editorial Comment

New Planting vs. Replanting

UNDER the new restriction agreement, signatories are permitted a certain amount of new planting. The task of the International Rubber Regulation Committee in determining quarterly export quotas is relatively simple as compared with that of deciding how much new planting shall be permitted from time to time. What the Committee has to do, in the latter instance, is to estimate the world's rubber requirements approximately four years in advance. However, it has approached its task boldly and has decided that during 1939 and 1940 approximately 431,000 acres of new land may be planted with rubber, or the equivalent of 5% of the present planted acreage.

There is considerable objection on the part of some rubber cultivators toward permitting new planting. This faction claims that the existing acreage is more than adequate to meet world consumption for many years to come. It also claims that in the event present cultivation should prove insufficient then the lag could be made up by replanting.

There are, however, serious weaknesses in this argument, a number of which were outlined in a recent issue of the *London Financial Times*. Chief among these are the fact that approximately 25% of the present acreage was planted at least twenty-five years ago when little was known about the behavior of trees under tapping over extended periods and it is very probable that these trees were tapped more freely than was prudent, while other practices were indulged in which are now frowned upon and avoided.

Furthermore, it is pointed out, there must be a limit to the economic life of rubber trees and certainly old trees are less productive per acre than newer ones. Merely to maintain the productive capacity of the existing acreage, therefore, would require a good deal of replanting. It must also be remembered that of the present acreage only one-half is in European hands and the other in that of natives. It is very questionable whether native smallholders would replant to any great extent under any conditions.

There are other factors in favor of new planting. For instance, new planting makes possible the adoption of modern, scientific plantation practices which result in greater yield per acre. Also, cost of new planting is not as large as replanting. In view of the plantation industry's apparent need for increased efficiency and lower production costs it would seem wrong to discourage new planting unless general economic arguments against fresh additions to productive capacity were of overwhelming force, which is certainly not the case at present.

The decision of the Regulation Committee to permit new planting should be hailed by both the producing and consumer units of the rubber industry. For the former, it enables lower producing costs and a wider profit margin; for the latter, it is a guarantee of an adequate supply of rubber in the years to come.

•

Cotton Cartel?

A SERIOUS situation confronts this country with regard to its cotton surplus. When the present cotton year opened last August, the surplus of American cotton was over 13,000,000 bales; by next August it probably will reach an all-time peak of 14,500,000 bales. This situation has given rise to talk of an international export agreement or cartel of cotton. The suggestion was originally made by Secretary of Agriculture Wallace.

American cotton growers have put more and more cotton in storage and taken Federal loans so that they wouldn't have to sell the enormous surplus at destructive prices. Even now, the cotton states are asking for additional Government support to the tune of $400,000,000 to $500,000,000 a year to give the South parity income. The Administration has made no move to date on these requests,

Some authorities insist that the surplus of cotton should be destroyed; others would return it to the farmer who would voluntarily curtail crop correspondingly. But Washington sees no feasible plan but world cooperation, so we may shortly expect some action taken on a possible cotton cartel.

CURRENT • NEWS of the Rubber Industry

FEBRUARY, 1939

SURVEY INDICATES A FAVORABLE YEAR

Manufacturers of tires and tubes, as a group, fared relatively well in 1938, according to a survey of the tire and rubber industry recently completed by the Poor's Publishing Company of Wellesley, Mass., publisher's of the well-known "Poor's Industry and Investment Surveys." Decline in sales to the automobile industry was partially offset by a larger replacement business and increased use of tires on farm machinery. Thus, shipments of pneumatic casings were off only 21% as against a drop of 47% in new passenger car and truck output.

From an earnings standpoint, the industry was even more fortunate. Tire prices were well maintained at a figure based on crude rubber costs of 17 to 18 cents a pound. Meanwhile, this raw material sold at an average price of less than 15 cents. As a result, profit margins were the widest in years. This situation went far towards offsetting the adverse effects of reduced sales. Finally, the virtual absence of unfavorable year-end inventory adjustments lifted the year's income above 1937 levels for many producers.

Increased Tire Shipments Certain

The outlook for the current year is definitely favorable according to the survey. Most authorities agree that new car production may reach 3,800,000 units this year. Such an output, alone, would increase tire shipments 12% to 14%. In addition, important increases in demand for replacement tires are expected. The most fertile field for replacements is on cars from two to six years old. Younger machines have not yet worn out original equipment, while older ones tend heavily towards "retreads" and "second-hands." The current year will witness a large increase in the two to six year class as the near-record 1937 output comes of age.

Mechanical rubber goods sales, which are closely related to the volume of industrial production, will, of course, be considerably larger than they were under the unfavorable economic conditions prevailing during much of 1938. Furthermore, gains should be more marked than indicated by industrial production indexes, for the application of rubber to manufacturing processes continues to expand as a result of aggressive research.

New Use for Inner Tubes

Inner tubes play a part in a method devised by the United States Forest Service for preventing decay of fence posts, according to a recent issue of *Witcombings*. The posts are placed on the ground with the butt ends raised and are peeled for about a foot. A section of close-fitting inner tube is slipped over the peeled section and tied tightly in place, and the open ends of the tubes are clamped to a bar above the butts. The tubes are then filled with a preservative solution of zinc chloride dissolved in nine times its weight of water. In about 24 hours the solution is absorbed and displaces the sap of the posts.

Further increases in the proportion of rubber-tired farm equipment is expected this year. In 1937, for the first time, more rubber-shod tractors were sold than were steel-wheel equipped. Tires have clearly demonstrated their advantages to the farmer. As yet the market is small, but as time passes a sizeable annual replacement demand will develop.

Production of the new latex sponge rubber, recently adopted by a few automobile and furniture producers, is being stepped up, but this product will not contribute importantly to the rubber industry's earning power for some years. The product is still too expensive to interest manufacturers of low-priced cars. However, further improvements in manufacturing technique and wider usage will bring down costs.

Profit Margins Still Favorable

While the spread between raw material costs and finished goods prices is not so wide as it was nine months ago, profit margins are still considered favorable. The rise in crude rubber quotations to the level prevailing since last Summer has been largely offset by lower production costs resulting from spreading relatively fixed costs over a larger volume of output.

Current tire prices permit a good profit as long as crude going into them averages less than 17 cents a pound. Prospects are that this level will not be exceeded in the immediate future. Moreover, there is little doubt but that adjustments will be made when needed.

FURTHER CENSUS DATA ON RUBBER INDUSTRY

According to the latest report from the Bureau of the Census, there were 420 establishments engaged in the manufacture of rubber goods other than tires, tubes and boots and shoes in the United States during 1937. The census reports do not cover plants with an annual production valued at less than $5,000 since such plants account for a negligible portion of the national output.

The report for "other rubber goods" shows a moderate increase in employment and considerable increases in wages and value of products for 1937 as compared with 1935, the previous census year. The number of wage earners employed in 1937 was 48,172, an increase of 19.5% over the 40,307 reported for 1935, while wages paid amounted to $54,176,139, an increase of 37.7%. The total value of products made in this branch of the industry in 1937 is set at $242,716,952, an increase of 36% over the 1935 figure of $178,405,388.

It should be explained that the item for wage earners is an average of the numbers reported for the several months of the year. In calculating it, equal weight is given to full-time and part-time wage earners (not reported separately by the manufacturers).

Types of Factories Covered

As classified for census purposes, this branch of the industry covers establishments using crude rubber, latex, or gutta-percha as an important constituent in the manufacture of their products. The products are rubber belting and hose, rubberized fabric and cloth, druggists' sundries, rubber mats, hard rubber goods, rubber heels and soles, and other rubber products. Data covering the tire and tube and the boot and shoe branches of the industry has appeared in previous issues of THE RUBBER AGE.

A compilation of the census data covering the rubber industry for 1937, reveals that there was a grand total of 478 factories engaged in the production of all types of rubber products, with 20,147 salaried employees and 129,818 wage earners. Salaries paid amounted to $45,021,086, and wages paid $171,304,546. The compilation also reveals that a total of $514,260,412 was expended for materials, fuel, electric energy and contract work in 1937. The value of all products reached $883,032,546, while value added by manufacture totaled $368,772,134.

PROFESSOR LESSELLS REVIEWS TIRE TREADS

Continuous contact between tire and road surface and side drainage for the layer of water between tire and road, which is the basic cause of skidding, are found to be salient factors in the designing of non-skid automobile tires, according to a review of two years of skid experiments by Professor John M. Lessells of the Massachusetts Institute of Technology in the February, 1939, issue of *Mechanical Engineering*. Entitled "A Rational Approach to Tire Tread Design," the article presents conclusions and data compiled in two years of skid tests conducted in the Goodrich research laboratories at Akron.

It was found that tire treads designed in narrow zig-zag angular bars with side drainage grooves provide a greater coefficient of friction on wet pavements. The M.I.T. professor, who is also technical editor of the *Journal of the Society of American Engineers*, said tests revealed that such a tread "if properly designed, acts as a windshield wiper to sweep the water from the road in wet weather."

At the outset of his paper, Professor Lessells reviews several previous studies of skidding, a problem which traffic authorities say causes 750,000 injuries annually. Experts such as O. Reynolds of Cambridge University, and T. R. Agg and R. A. Moyer of Iowa State College have agreed, Lessells pointed out, that better grip on the road results from use of a tread design which maintains "continuous contact between tire and pavement." However, these tests were made almost entirely on dry roads, the M.I.T. faculty member added. Conducted entirely on wet roads, the Goodrich experiments confirmed previous tests but raised a new set of problems.

New Problems Are Raised

"The analysis of a tire on a wet road raises an entirely new set of problems because the water acts as a lubricant and provision must be made for its removal from underneath the tire if the higher values of frictional co-efficients as pertain to dry surfaces are to be approached. With smooth or worn tires operating on dry roads, the values are high. With wet roads, however, such tires have no provision for getting rid of the water entrapped between the tire and the road. The new tread gives a higher value of co-efficient of friction because the tread, if suitably designed, acts so as to wipe the water from the road surface. Moreover, the water if not eliminated by the wiping action of the leading tread is easily squeezed out by the pressure into the grooves of the tread. This drainage effect is as important as the wiping action of the tread," the author writes.

Data used by Professor Lessells in his calculations were compiled by Goodrich scientists who used a special two-wheel trailer towed by a truck. A sprinkler on the truck sprayed the road with water, and scientific instruments attached to the wheels of the trailer, one of which was equipped with a hydraulic brake while the other ran free, measured the effectiveness of smooth, circumferential and transverse tread patterns as well as the approved angular design in terms of both forward and side slippage in skidding.

"A hydraulic dynometer cylinder and an oil column communicating with a pressure-recording device were used to check the skid results," Lessells explained, "while revolutions of the braking wheel were recorded on a chart through an electrically controlled pencil. Half revolutions were also recorded for more intricate calculations."

Coming Events

Feb. 23-25. Spring Meeting, A.S.M.E., New Orleans, La.

Feb. 24. Detroit Rubber Group, University Club, Detroit, Mich.

Mar. 3. Boston Rubber Group, Seville Restaurant, Boston, Mass.

Mar. 7. Los Angeles Rubber Group, Mayfair Hotel, Los Angeles, Cal.

Mar. 17. New York Rubber Group, Building Trades Club, New York City.

Mar. 20-22. Annual Convention, N.A.W.M.D., Hotel Sherman, Chicago.

Mar. 24. Akron Rubber Group, Elks Club, Akron, Ohio.

Apr. 5-6. Spring Meeting, Rubber Division, A.C.S., Emerson Hotel, Baltimore, Maryland.

Apr. 17-30. American Toy Fair, Hotel McAlpin, New York City.

May 22-June 8. World Automotive Engineering Congress, auspices S.A.E., New York, Indianapolis, Detroit and San Francisco.

June 26-30. Annual Meeting, A.S.T.M., Chalfonte-Haddon Hall, Atlantic City.

Aetna Case Heard

The suit brought by the incumbent officers of the Aetna Rubber Company to establish their rights as sole executives of the company, disputed by an anti-management group, was heard in the Court of Appeals at Cleveland on January 19. The hearing brought out that when the company was organized 7,000 shares of common and 3,000 shares of preferred stock were issued. A by-law of the company states that "the holders of the preferred stock shall be entitled to the same voting power as holders of common stock." The old officers contended that the preferred stock now has a voting ratio of 89 to 1 against common stock because there is now outstanding 88,000 shares of common and only 980 shares of preferred. Determination of this issue is expected to decide the suit. A decision will probably be handed down in the next several weeks.

AUTOMOTIVE GROUP HAS ANNUAL MEETING

Four papers delivered at the annual meeting of the Society of Automotive Engineers, Inc., held on January 9 to 13, at the Book-Cadillac Hotel, in Detroit, were of special interest to members of the rubber industry. These were: *Pneumatic Tires as They Should be Engineered for Our Future Cars*, by W. S. James, Studebaker Corp., and P. C. Ackerman, Chrysler Corp; *Designing the Tire for the Car*, by E. A. Roberts, Firestone Tire & Rubber Co.; *Development of Foamed Latex Cushioning*, by E. E. Ellies, Goodyear Tire & Rubber Co., and *Noise and Vibration*, by E. E. Wilson, General Motors Corp.

In his paper on foamed latex cushioning, Mr. Ellies stressed the point that not only is this material more comfortable than other materials, but it also makes for greater safety. In near accidents of certain types, the shock absorbing qualities and stability of latex cushions are a definite aid in maintaining control, he said, while in actual accidents the resilient surface and gradual bottoming of foamed latex, not only in cushions but also in back rolls and structural padding, make it a worthwhile complement to the general theme of safety in present body design. This paper will be published in full in our next issue.

Mileage Test Results

The paper on "Designing the Tire for the Car," by Mr. Roberts, cited a test which showed that 142% more mileage was reported for front tires at a car speed of 55 m.p.h. than at 70 m.p.h., and 100% more mileage on rear tires for the same speed differences. He pointed out that present ratings in the passenger car tire field are made on the basis of load only, and proposed a new basis for rating such tires based on the horse power of the engine as well as on load. Factors other than load were taken into consideration in some fields of tire engineering, according to the speaker, such as in the case of tires on trailing vehicles.

The subject of insulating passenger cars against noise and vibration was the theme of the paper presented by Mr. Wilson, associated with the Proving Ground Division of General Motors. He described various materials now being used for such purpose and had this to say about rubber: "The use of rubber between the body and the frame, to suppress road noise by isolating the body from the chassis, sometimes raises problems, chief of which is the necessity of increasing the frame structure stiffness."

In all, 33 topics were discussed at the 20 sessions held at the meeting. One full day of the five-day program was devoted to national defense, with officers of the Army and Navy addressing the Society on topics dealing with land and air transportation as related to our armed forces. Other features of the meeting included the annual engineering exhibit and a showing of technical and human interest photographs.

LOS ANGELES GROUP HOLDS BOYS' NIGHT

Approximately 100 members and guests attended the monthly supper meeting of the Los Angeles Group, Rubber Division, A.C.S., called Boys' Night, held at the Mayfair Hotel in Los Angeles on February 7. Boy Scouts and sons of members of the Group were guests, with the Scouts furnishing a portion of the program.

E. B. McGroot, chief executive, Los Angeles Council, Boy Scouts of America, delivered the principal address of the evening, devoting one-half of his talk to Scout activities, and the other to father and son relationships. Other entertainment features presented by the Scouts included an accordion trio which played throughout dinner, and a motion picture of Scouts at work.

Another feature of the meeting was an address by A. F. Pond, of U. S. Rubber, who discussed modern scientific processes of rubber compounding. A ventriloquist (Bob Fisher) added a touch of additional humor to the program.

At the conclusion of the program, Garvin Drew, chairman of the Group, presented Mr. McGroot with a variety of rubber products donated by various rubber manufacturers. A purse of $28.00 was also presented to him with the compliments of the Group for the purpose of sending two boys to camp for one week.

The business session of the meeting featured the appointment of a new committee—the Reception Committee—the members of which are A. S. Rocklen (Golden State Rubber Mills) chairman; and Victor H. Vodra (Goodyear) and Frank Shew (Darnell Corp.). Members of this committee will wear colorful fez caps at all future meetings, so that new members and guests can readily recognize them. Door and special prizes for the evening were contributed by the Johnson Steel & Wire Co., H. M. Royal, Inc., and the Dill Manufacturing Co.

U. S. FOREIGN TRADE IMPROVES SLIGHTLY

Foreign trade of the United States in rubber manufactures showed an improved tone in December, 1938, according to a report from the Leather and Rubber Division of the Bureau of Foreign & Domestic Commerce, Washington, D. C. Imports of $85,302 worth of foreign rubber goods showed an increase of 5.2% from the figure of $81,065 in November. A comparison of the December imports with those of the same month in 1937 showed a decline of 23.2% which is a definite improvement over the November comparison which showed a 32.2% decline.

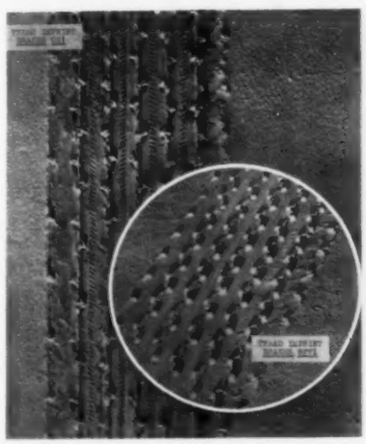
Imports of foreign rubber manufactures, according to the report, showed a decline of 49% in the first eleven months of 1938 as compared with the same period in the preceding year, but this decline was reduced to 47.5% in the twelve month period by the increased trade in December.

Exports of rubber products from the United States for the month of December amounted to $2,455,446, an increase of 12.7% over the November figure of $2,178,327. A similar comparison with the value of exports for December, 1937, showed a decline of only 2.6%. For the first eleven months of 1938, exports showed a decline of 16.4% as compared with 1937, but this was reduced to 15.3% in the twelve month period by the increased trade in December.

Declines were recorded on exports of all kinds of rubber products from the United States in 1938 as compared with the previous year. The amounts exported by value together with the percentage of decline follows: *Tires, tubes, repair materials and tire sundries*—$13,582,699 (14.3%); *Footwear, soles and heels*—$914,354 (21.7%); *Mechanical rubber goods*—$4,465,557 (18%); *Rubberized fabrics*—$948,350 (14.1%); *Specialties and sundries*—$2,469,265 (3.2%); *Hard rubber goods*—$500,894 (17.5%); *Semi-manufactured goods* — $2,720,002 (25.9%); *All others*—$1,580,395 (7.2%).

Royal DeLuxe Tire

The U. S. Royal DeLuxe Tire, featuring a basically different principle in tread design, said to offer superior stopping power, has been introduced by the U. S. Tire Dealers Corporation. The



new tread is described as "a tread within a tread." It has a six-row nonskid block design and a new quick-stopping device which places on the ground more than 2500 extra, sharp-gripping edges. As the miles pile up, the gripping edges are said to become more pronounced and, in addition, to retain their keenness by literally sharpening themselves against the pavement. The accompanying photograph shows the new tread device in action when brakes are applied and how the "grippers" open up, crowding the gripping edges against the road surface. The inset indicates how these edges spring back to form smooth rolling ribs when the car is cruising.

N. Y. RUBBER GROUP MEETS ON MARCH 17

The next meeting of the New York Group, Rubber Division, A.C.S., will be held on Friday, March 17, at the Building Trades Club in New York City. The date was set at a meeting of the Executive Committee of the Group, held in New York on January 27.

The technical portion of the meeting has already been arranged, according to B. Brittain Wilson, of the *India Rubber World*, secretary-treasurer of the Group. Dr. Ernst A. Hauser, associate professor of colloid chemistry at the Massachusetts Institute of Technology, will speak on "The Vulcanization of Rubber under Stress." It is also understood that he will devote part of his talk to a description of the new translucent paper-like film made from clay which is rapidly taking hold as an insulation material. In addition, a motion picture of balata cultivation will be shown by Jacobus F. Frank, representative in this country for the rubber interests of the Netherlands East Indies Government.

An innovation will take place at this meeting. The technical session will start promptly at 4:30 P.M. and not after dinner as in the past. After the technical session, dinner will be served, following which a program of entertainment will be presented. The attention of members and guests planning to attend the March 17th meeting is particularly called to this change in program timing.

The Executive Committee also decided to replace the usual summer outings with a social and dance, which will enable wives of members of the industry to get to know each other better. Similar functions held by the Chicago Rubber Group have proved quite successful. The social and dance will be held on May 19.

Course in Synthetic Resins

An evening course in synthetic resins will be offered on Thursday evenings from March 23 to June 8 by the Chemical Engineering Department of the University of Southern California, Los Angeles. The course, to be given by R. B. Stringfield, well known consulting chemical engineer and formerly chief chemist of the Goodyear Tire & Rubber Co., will cover the chemistry, production and utilization of modern synthetic resins. Mr. Stringfield also gives courses on rubber technology at the University.

Grant Additional Time

The United States Rubber Company and the U. S. Tire Dealers Corporation have been granted an extension of time in which to answer charges of unlawful price discrimination in the sale of tires filed against them recently by the Federal Trade Commission. The two companies now have until March 1 to answer the complaint. The replies were due on January 31.

RUBBER DIVISION MEETS ON APRIL 5-6

The Rubber Division, A.C.S., will hold its next meeting on Wednesday and Thursday, April 5 and 6, in the Emerson Hotel at Baltimore, Maryland, in conjunction with the Spring Meeting of the Society which will be held the week of April 3. Headquarters of the Rubber Division will be at the Emerson Hotel and those wishing to attend are urged to make early reservations.

A part of the program at the meeting will be devoted to a Symposium on Synthetic Rubber and Elastic Polymers, according to George K. Hinshaw, of Goodyear, chairman of the Division. The symposium will be restricted to either two sessions or one day's meeting, the balance of the program to be given over to the presentation of papers of a more general nature in as many sessions as will be required.

All members of the Division are invited to submit papers reporting original work for presentation before either the symposium or the general sessions, although it is suggested that papers pertaining to vulcanization be withheld until the Boston meeting next Fall when this subject will be the keynote of the Goodyear Centennial Program. The deadline for receiving papers, four copies of which should be submitted, together with an abstract of two hundred words or less, has been set for February 18.

SHEPARD ADDRESSES RHODE ISLAND CLUB

Approximately 90 members and guests attended the Winter meeting of the Rhode Island Rubber Club, held at the Narragansett Hotel, in Providence, on January 13. The meeting featured a bowling tournament before dinner and addresses by Dr. Norman A. Shepard, director of technical service, American Cyanamid & Chemical Corporation, and Lewis Bellem, Jr., the man who installed the radio sending station on Pitcairn Island.

In his talk, Dr. Shepard traced the development of American Cyanamid, exhibited a number of slides, and described the arrangement and equipment of the company's vast laboratory at Stamford. He then discussed a number of rubber chemicals and compounding ingredients made by American Cyanamid and displayed several charts and diagrams comparing the characteristics and performance of these materials with competitive makes. He particularly stressed the company's new activator, Aero AC 50.

Discussing Pitcairn Island, Mr. Bellem told how the radio sending apparatus was secured by contributions from various manufacturers and how it was pieced together. He then discussed the life and habits of the islanders and showed a four-reel picture taken on the Island. He revealed that there are only 70 families living on the Island with only 7 family names.

Weight of Average Tire

The weight of the average passenger car tire increased from 15.4 pounds in 1922 to 27.8 pounds in 1938, according to the Department of Commerce. The 1938 average tire contains approximately 13.73 pounds of rubber and 4.37 pounds of cotton, or approximately 65% of the entire weight. The percentage of cotton dropped and that of rubber increased with the advent of the balloon casing. Average inner tube weights are said to have increased from 2.24 pounds in 1922 to 3.01 pounds in 1938, with rubber totaling 2.2 pounds in the latter case.

Twenty-five bowlers participated in the tournament preceding dinner. Arthur Davis (Goodyear Footwear) won the high singles, with other honors going to Del Gifford and Frank Donovan (Sessions-Gifford) and to Mr. Demer. Prizes were awarded for bowling honors. These prizes, plus a number of door prizes, were purchased with money left over from donations made for the previous meeting of the Club with the exception of a traveling bag given by Ernest Jacoby & Co. The Wishnick Golf Trophy, won by the team representing the Anaconda Wire & Cable Company in 1937, was presented to the team representing Respro, Inc., at the meeting, the latter team having won it in 1938.

Canadian Group Meets

Dr. A. A. Somerville, of the R. T. Vanderbilt Co., New York City, was the chief speaker at a meeting of the Ontario Rubber Division of the Canadian Chemical Association, held at the University of Toronto in Canada on January 18. Selecting as his topic, "How to Kill a Business," Dr. Somerville dwelt on the effects of fair and unfair competition on a business and the further effects of various methods adopted to meet unfair competition. He also showed a color movie of a bull fight taken on one of his many trips abroad. Both the dinner and the meeting were well attended.

Boston Group to Meet

The Boston Group, Rubber Division, A.C.S., will hold a meeting on Friday, March 3, in the Seville Restaurant on Boylston Street in Boston. The meeting will be addressed by Dr. William F. Tuley, assistant sales manager for rubber chemicals and reclaimed rubber of Naugatuck Chemical, who will speak on "Twentieth Century Shadows of Charles Goodyear." He will emphasize the development and use of modern accelerators. The second speaker will be Warren S. Lockwood, director of the Crude Rubber Development Bureau, Washington, D. C., who will discuss "Uses of Rubber in Agriculture."

AKRON GROUP HOLDS MID-WINTER MEETING

Approximately 260 members and guests attended the mid-Winter meeting of the Akron Group, Rubber Division, A.C.S., held at the Elks Club in Akron on January 20. This was one of the largest crowds ever to attend one of the meetings of the Group. The meeting featured a showing of the motion picture "Rubber Reborn" and an address by Dietrich Rempel, an artist of the Sun Rubber Company.

William Welch, president of the Mid-West Rubber Reclaiming Company, sponsors of "Rubber Reborn," which traces the manufacture of reclaimed rubber from raw material to finished product, preceded the showing of the picture with a few remarks stressing his faith in Akron as the present and future center of the rubber industry. He also paid tribute to his old friend and advisor, F. A. Seiberling, who was seated beside him.

After the showing of the picture, Mr. Rempel delivered his informal address. He gave an interesting account of his experiences as a boy during the Russian Revolution, and told how his brother was killed by the revolutionists and how his parents died as a result of the hardships occasioned by the fighting. He and some members of his family were brought to the United States through the efforts of relatives already in this country and with the help of the Relief Commission working at that time under the direction of Herbert Hoover.

The next meeting of the Group is scheduled for March 24, at which time W. J. McCortney of the Chrysler Corporation will deliver an address on "What the Automotive Industry Expects of the Rubber Chemist."

Chicago Group Meeting

The Chicago Group, Rubber Division, A.C.S., was scheduled to hold its first meeting this year at the Hotel Sherman in Chicago on February 10. Dr. J. K. Stewart and D. D. Rubek of the Chicago office of the Anderson-Prichard Oil Corporation were scheduled to deliver a paper on "The Practical Application of Petroleum Solvents for Rubber Cements." This paper is reproduced elsewhere in this issue. A full report of the meeting will appear in our next issue.

Detroit Meets February 24

A meeting of the Detroit Group, Rubber Division, A.C.S., will be held at the University Club in Detroit on Friday, February 24. Two papers will be delivered, one on "Rubber Testing as Evaluated by the Automotive Engineer," by Mr. Danse of the Cadillac Motor Car Co., and the other on "The Production and Application of Rubber Latex," by J. E. Hutchman of Naugatuck Chemical. An entertainment program will also be a feature of the meeting.

Names in the News

J. E. TRAINER, for many years general superintendent of the Babcock & Wilcox Co., and now general production manager of the Firestone Tire & Rubber Co., was tendered a banquet by his former associates on January 21. He was presented with a handsome watch.

WEBSTER N. JONES, of the Carnegie Institute of Technology, who was re-elected vice-president of the American Institute of Chemical Engineers at the annual meeting of the Institute last November, was elected president at a meeting of the Council, held recently, to succeed the late F. C. ZEISBERG. JAMES G. VAIL, vice-president of the Philadelphia Quartz Co., was elected vice-president.

JOHN G. HAY, closely associated with English rubber plantation interests and a member of the International Rubber Regulation Committee, recently received a knighthood from King George for his services with the Committee.

WALTER A. GRAHAM is now acting as Pacific Coast representative for the Charles T. Wilson Co., Inc. He maintains headquarters at 815 South Hill Street in Los Angeles. The appointment was effective January 3.

J. PENFIELD SEIBERLING, president, Seiberling Rubber Co., Akron, addressed a meeting of the Orrville (Ohio) Rotary and Exchange Club on January 12. He spoke on the "Romance of Rubber."

J. E. SMITH, vice-president and factory manager of the R-C-A and Eclat Rubber companies, was installed as president of the Cuyahoga Falls Kiwanis Club at ceremonies held at the Canteen in Cuyahoga Falls on January 3.

CHARLES M. KNIGHT, who founded the first college course in rubber chemistry at the University of Akron, observed his ninety-first birthday last month. He resides in Miami, Florida.

N. BJORNSON, sales promotion manager, Cotex Corporation, Newark, N. J., and J. H. WINCHESTER, credit manager, Ohio Rubber Co., Willoughby, Ohio, were recently awarded Dartnell Gold Medal Awards for writing some of the best business letters of the year.

LEONARD K. FIRESTONE, trade sales manager, Firestone Tire & Rubber Co., Akron, was elected a member of the board of trustees of the Akron Community Chest last month to fill the unexpired term of his late father. At the annual stockholders' meeting of Firestone, held in Akron recently, he was named a director of the company.

DR. HENRY M. WALTON has joined the research staff of the Continental Carbon Company, 295 Madison Avenue, New York City, where he will engage in research work on the carbon black produced by the company for the rubber, paint, printing ink and other industries. DR. WALTON received a Doctor of Laws degree at the University of Frankfort am Main in 1933, and a Ph. D. in chemistry at the University of Chicago in 1938.

MRS. JOHN HERRON, who gained considerable recognition for her work as chairman of the costume committee of the Akron Rubber Ball when she designed and created a number of rubber costumes, addressed the Akron Art Institute on February 4 as the first speaker in a series of lectures sponsored by the Institute for the purpose of giving instruction in costume designing with rubber materials.

C. W. UFFORD, personnel manager, Ohio Rubber Co., Willoughby, Ohio, has been appointed to the faculty of Cleveland College. He will give a course in personnel management, but continues his duties with Ohio Rubber.

JOHN E. NOONAN, for many years chief of the processing division of the B. F. Goodrich Co., Akron, retired last month after 41 years of service with the company and 50 years of activity in the rubber industry. He joined Goodrich in 1898 after serving nine years with the old Revere Rubber Company at Revere, Mass.

L. E. PECK has been appointed Midwest district sales manager for the Lake Erie Engineering Corp., Buffalo, N. Y., manufacturers of hydraulic presses for all purposes. He is located at 1540 East 53rd Street, Chicago.

FRANK A. PETRIE, public relations department, Goodyear Tire & Rubber Co., was elected president of the Summit County (Ohio) Ohio State University Alumni Association at the annual meeting and banquet of the Association held in Akron on February 3.

G. A. BOUVIER, associated with the General Cable Corporation for many years, was recently appointed director of manufacturing development at the Perth Amboy (N. J.) plant.

Synthetic Rubber Tires

According to an announcement from Berlin, the production of Buna, the term applied to German synthetic rubber, has attained a rate which will permit all passenger automobile tires in 1939 to be made solely of that rubber. The statement is doubted by many authorities.

Changes at U. S. Rubber

According to an announcement from the United States Rubber Company, John P. Coe, formerly sales manager, has been appointed general manager of the Naugatuck Chemical Division. Robert E. Casey continues as sales manager for rubber chemicals and reclaimed rubber, while Thomas G. Richards continues as sales manager for latex and dispersions. Dr. William F. Tuley has been named assistant sales manager for rubber chemicals and reclaimed rubber.

Frederick P. Jecusco

Dr. W. A. Gibbons has been appointed director of the general development division at Passaic, N. J. Elmer Roberts, vice-president, has been elected president and general manager of the U. S. Rubber Export Co., Ltd., succeeding W. A. Eden, resigned. Mr. Eden continues as a director. Mr. Roberts also has supervision of the Naugatuck Chemical and the General Development divisions.

Frederick P. Jecusco has been appointed manager of the Mechanical Fabrics Division at Providence, R. I. Mr. Jecusco was long associated with the Ansonia O. & C. Company and helped to establish the Chatham Manufacturing Company for the making of cut rubber thread. He was sales and general manager of Chatham when the company was acquired by U. S. Rubber.

M. P. Lewis, former Eastern district manager, has been named assistant manager of the Wire Sales Department, while H. H. Weber, assistant manager of the department since 1934, has been appointed commercial engineer. C. W. Short, development manager at the Bristol plant for the past two years, is now associated with the sales division.

Frank Leahy, associated with the sales promotion department of the Footwear Division, and recently line coach for the Fordham football team, has been named head coach at Boston College, replacing Gil Dobie, resigned.

New England News

The 1939 outlook for the tire business is very encouraging, according to Charles E. Speaks, president of the Fisk Rubber Corp., Chicopee Falls, Mass., who pointed to the enthusiastic reception given this year's new car models. The Fisk corporation paid its first dividend on common stock since 1920 in 1938, and the number of employees at the main plant passed the normal average of 1,500 at the beginning of this year.

John A. Peterson, mechanical engineer at the Fisk plant for some years, has gone abroad to become manager of Fisk's new Scandinavian plant at Viskafors, Sweden. Tire production there is expected to begin this spring. Manufacture of rubber footwear will be continued at the Swedish plant.

Acushnet Process Co., New Bedford, Mass., staged an exhibit of its products recently which included golf balls in every stage of development from raw rubber to finish and the miscellaneous molded rubber items made by the company, including ice bags, syringes, hot water bottles and many others. The company has bought one unit of Nashawena Mill B in New Bedford to be used for expansion of manufacturing facilities.

New Era Rubber Mfg. Co., Inc., has been formed at 159 Everett Avenue, Chelsea, Mass. Capitalization is $100,000, and the officers are as follows: Frank W. Jackson, president; Andrew E. Falcian, treasurer, and Stuart R. Sharp, clerk.

Carr Manufacturing Co., Bristol, R. I., which recently completed an addition of 4,000 square feet, is planning another one-story plant addition. The plant now has about 60,000 square feet of floor space. Rubber thread is the company's principal product.

Bristol Manufacturing Co., Inc., Bristol, R. I., maker of rubber footwear, has leased two additional rooms in the building of the National India Rubber Company plant which it occupies, bringing the total floor space to nearly 60,000 square feet. Production has been increased, with about 300 hands employed.

A. G. Spalding & Bros. of Chicopee and Fisk Rubber Corp. of Chicopee Falls were among the companies receiving merit award citations from the Associated Industries of Massachusetts recently. The Spalding citation was for its developments of new golf clubs and inflated balls, especially the principle of making inflated balls on a last or form which assures perfect balance and accuracy. The Fisk company was praised for the development of its Safti-Flight tire.

Acme Wire Co., New Haven, Conn., has declared the regular quarterly dividend of 25 cents a share, payable February 15 to stockholders of record January 31. The annual meeting of stockholders will be held March 10.

Edward L. Winghee, 34, an assistant superintendent of the Russell Manufacturing Co., Middletown, Conn., died on January 18, following a brief illness. Survivors include his widow and two children.

Smith Heads Committee

W. L. Smith, of the B. F. Goodrich Co., has been elected chairman of the Technical Committee of the Rubber Manufacturers Association, succeeding H. M. Frecker, of the U. S. Rubber Company. M. Berman, Hewitt Rubber Corp., was named vice-chairman, succeeding Mr. Smith. E. A. Foote, of the R. M. A., is acting secretary. Other members of this committee are: C. H. Zieme (Republic Rubber), W. W. Sanders (Boston Woven Hose), A. B. Merrill (Goodrich), H. E. Morse (Goodyear), L. J. Howell (Hamilton Rubber), and W. L. Sturtevant (Manhattan Rubber). The Technical Committee, formerly called the Specifications Committee, represents the Mechanical Rubber Goods Division of the Association in matters pertaining to rubber specifications used by the army, navy and other government and industrial units. It has been functioning for the past twenty-six years.

To Open Natchez Plant

The Armstrong Rubber Co., Inc., West Haven, Conn., is expected to start manufacturing operations in its Natchez, Mississippi, plant by April 1. The plant represents the largest industrial development in Mississippi under terms of the 1936 Act which authorized local units of government to issue bonds for such purposes. It is said to have been built at a cost of approximately $300,000, and will furnish employment to about 400. It is understood that southern stores of Sears, Roebuck & Company will distribute all tires made in the Natchez plant.

New DuPont Factory

The Fabrikoid Division of E. I. du Pont de Nemours & Co., Inc., which operates a factory at Fairfield, Conn., has leased a plant in Russell, Mass., and expects to start operations in it early in March. "Texon," the company's latex-impregnated fiber sheet, used principally as midsoles and innersoles in shoe manufacturing, will be made at the new plant where better facilities are said to be available.

Rubber Safety Record

The rubber industry is the second safest large industry in the United States, according to E. W. Beck, supervisor of safety for the United States Rubber Co. Latest figures reveal that there are only four industries that have a better combined frequency and severity rate than the rubber industry, these being the tobacco, laundry, textile and printing industries. Of this group, only the textile field has a larger number of employees than the rubber industry, which leads Mr. Beck to the statement that the rubber industry is the second safest large industry in the country.

Little Makes Changes

Arthur D. Little, Inc., consulting chemists and engineers of Cambridge, Mass., has announced the discontinuance of routine testing and chemical analysis, other than as required for the research and development work on which the organization is principally engaged. The change of policy is attributed to steady increases in the extent and variety of industrial research which now requires the full attention and physical facilities of the company. Skinner & Sherman, Inc., 246 Stuart St., Boston, Mass., will make routine analyses and tests formerly handled by the Little organization.

Form Crown Rubber Co.

The Crown Rubber Company has been organized in Fremont, Ohio, and has already started operations at 1615 Croghan Street in the former factory of the Fremont Rubber Products Company. The new company will manufacture automobile rubber replacements, auto floor mats, stair treads and rubber household appliances. S. E. Hyman, Fremont manufacturer, is president of Crown Rubber, while Clyde A. Shoults and A. C. Morris, both of Akron, will act as general manager and superintendent, respectively.

New Estonian Factory

The Estonian Minister of Commerce has granted permission for the erection of a factory in Parnu, Estonia, for the manufacture of galoshes and other rubber products, according to a report from abroad. When completed the new plant will employ approximately 150 workers, mostly drawn from England and Germany. A rubber footwear plant has been operating in Estonia for some time but only on a comparatively small scale.

Producing Rubber Powder

The Rubber Stichting (Rubber Foundation) of Amsterdam, Holland, announces that it has granted a patent for the production of rubber powder to the chemical firm of Van Hasselt in Amersfoort, Holland. The powder will be produced at the rate of approximately 250 kilograms a week and will be finer than one millimeter in size. It will be used extensively in road construction work in Holland.

FINANCIAL NEWS

GENERAL TIRE EARNS PROFIT OF $1,181,224

A net profit of $1,181,224 for the fiscal year ended November 30, 1938, after provision for Federal normal income tax and surtax on undistributed profits, is reported by the General Tire & Rubber Co. This is equal to $1.97 each on 519,627 shares of $5-par common stock outstanding after dividends on the 6% preferred stock. In the preceding year, net profit amounted to $808,913, or $1.24 a share on 517,947 shares then outstanding.

Net sales, after all deductions, including adjustments, freight and excise taxes, were $20,088,354, as compared with $21,392,956 for the previous year, a decrease of 6.1%. The balance sheet as of November 30, 1938, shows current assets of $9,389,284 and current liabilities of $1,762,356, a ratio of 5.3 to 1, as compared with $10,287,211 and $3,119,766, respectively, at the end of the previous year.

According to the annual report of the company, General Tire paid off bank loans amounting to $2,000,000 during the year and still had more cash in banks and on hand than a year ago. It had no mortgages or funded debt of any kind. The report also contained a statement from W. O'Neil, president, revealing that $77,100 of preferred stock was retired by purchases for sinking fund and as a result preferred stock outstanding has been reduced to $2,594,400. Also retired was $80,700 of the preferred stock of Aldora Mills, a company of which General Tire owns 100% of the common stock and from which it obtains a large proportion of its fabric requirements.

DAYTON RUBBER CO. INCREASES PROFIT

Dayton Rubber Manufacturing Company reports net earnings of $472,548 after all charges for the fiscal year ended October 31, 1938. After preferred dividends this is equal to $2.15 a share on 176,839 shares of common stock outstanding. In the preceding year the company reported net profit of $334,834, or $1.37 a share on common shares then outstanding. Net sales for the year were $7,392,706, a decline of approximately 12% from the preceding year.

The balance sheet as of October 31, 1938, shows a ratio of current assets to current liabilities of 3.6 to 1 as compared with 1.9 to 1 at the end of the previous fiscal year. It also shows a recently incurred long-term bank loan of $750,000 which was used to supplement working capital. In a statement accompanying the report, A. L. Freedlander, president, attributed the favorable earnings to wide diversification of the company's products achieved through research.

A proxy has been sent by the company to all stockholders asking approval of a "management incentive compensation plan," which has already been approved by the directors. Stockholders were also asked to approve a change from no-par value to $1-par value on the common stock, the company pointing out that such a change would reduce transfer taxes.

Goodyear of Canada, Ltd.

For 1938: Net profit of $2,228,879, equal after preferred dividends to $7.49 each on 257,260 no-par common shares, compared with profit of $1,364,347, or $4.14 a share, in the preceding year. Net working capital amounted to $8,969,653 on December 31, 1938, against $9,067,910 a year earlier. Cash on hand amounted to $1,040,196 compared with $1,093,577, while call loans and government bonds of $1,969,347 compared with $1,537,817. Inventories were $4,361,358 and $4,700,119, respectively.

New Jersey Zinc Co.

For 1938: Net income of $3,220,314 after charges for Federal taxes, depreciation, depletion, contingencies and other deductions, which was equal to $1.64 each on 1,963,264 shares of $25-par capital stock outstanding. This compares with net income of $7,871,914, or $4.01 a share, reported for the previous year. Net income for the fourth quarter of 1938 amounted to $1,035,210, equal to 53 cents a share, which compares with $1,347,986, or 68 cents a share, in the same quarter of the previous year.

A. G. Spalding & Bros.

Year ended Oct. 31: Net loss of $1,054,391 after all charges, taxes, reorganization expenses and inventory write-down, which compares with net loss of $310,866 in the preceding fiscal year. Company reports that a loss of $372,958 was caused by extraordinary expenses, due to discontinuance and liquidation of retail departments, as well as reorganization of other activities. The current financial position remains strong, with $6,377,403 in current assets against $722,438 in current liabilities.

Dissolving Providence Wire

The Collyer Insulated Wire Company, Pawtucket, Rhode Island, is said to have filed a petition in the Superior Court for Providence County requesting the dissolution of its wholly-owned subsidiary, the Providence Insulated Wire Company, Providence, R. I. There is no doubt that the request will be granted.

Rubber-Tired Tractors

More tractors were equipped with rubber tires at the factory in 1938 than in 1937, despite the fact that domestic production of wheel type tractors declined 28.2% for the year. Of the 1938 total, 64.1% were equipped with rubber tires as compared with 45.6% of the 1937 total. In all, 237,837 wheel type tractors were produced in 1937, of which 129,291 were steel-tired and 108,546 were rubber-tired, while 170,650 were produced in 1938, of which 61,206 were steel-tired and 109,444 were rubber-tired. This data is contained in a report on "Manufacture and Sale of Tractors, Combines and Grain Threshers—1938 and 1937" which may be obtained from the Bureau of the Census, Washington, D. C.

Organize Diamond Wire Co.

Because the manufacture of electrical wire has become so important a division of the Diamond Braiding Mills, Chicago Heights, Illinois, it was deemed advisable to set up a separate organization which will hereafter be known as the Diamond Wire & Cable Company. The new company will operate its own copper drawing plant and rubber mills and will manufacture electrical appliance cords and cables for the radio and electrical appliance field. The manufacture of the braided products division of the company, producing shoelaces and other products, will remain under the name of Diamond Braiding Mills, Inc., as a separate concern.

Reclaimers Elect Officers

A. I. Brandt, of the Philadelphia Rubber Works, was elected president of the Rubber Reclaimers Association at the annual meeting held at the Hotel Biltmore in New York City on January 17. H. S. Royce, Boston Woven Hose & Rubber Co., was elected vice-president, and John P. Coe, Naugatuck Chemical, treasurer. Mrs. M. B. Miller was re-elected secretary. The following were elected to serve on the board of directors for one year: A. I. Brandt (Philadelphia Rubber Works), V. H. Dingmon (Xylos Rubber), C. W. Harrison (Bloomingdale Rubber), E. H. Brooks (Goodyear), and William Welch (Mid-West Rubber Reclaiming).

Flintkote Company

For 1938: Net income of $811,818, equal to $1.21 each on 672,996 outstanding shares, which compares with $1,005,423, or $1.50 each on the 1937 shares outstanding. Net sales for the year amounted to $15,147,709 as compared with $15,163,867 in the preceding year.

Baldwin Rubber Co.

Quarter ended Dec. 13: Net profit of $156,843, equal to 49 cents each on 316,757 shares of $1-par capital stock, which compares with $73,957, or 23 cents a share, in the quarter ended December 1, 1937.

Obituaries

Dr. Ivan Ostromislensky

Dr. Ivan Ostromislensky, Russian scientist who made notable contributions in the fields of industrial and medicinal chemistry and who was associated with the U. S. Rubber Company for several years, died of a heart attack at the age of 58 on January 16 at his home, 605 West 141st Street, New York City. He was a pioneer in the development of synthetic rubber.

Dr. Ostromislensky was born in 1880 in Moscow and attended the University of Zurich, receiving his Ph.D. in 1902, and a medical degree four years later. In 1907 he received a chemical engineering degree from Karlsruhe Polytechnicum and in 1911 joined the faculty of the famous old university of Nizhni Novgorod. For a time he served as an assistant professor of chemistry and later as a full professor.

From 1911 to 1916, Dr. Ostromislensky engaged in private research work in Moscow. In 1916 he was appointed director of the chemotherapeutic division of the Scientific Institute of Moscow and remained in that position until he was forced to flee from Russia in 1921. In the latter year he lectured at the Polytechnical Institute in Riga, Latvia.

At the request of the U. S. Rubber Company, the Russian scientist came to this country late in 1921 and pursued his studies of synthetic rubber and new vulcanizing agents for rubber in the company's general laboratories in Passaic, N. J. He conducted a good deal of the original research work on metastyrene, and held patents on both styrol and styrene. Leaving U. S. Rubber in 1926, he founded the Ostro Research Laboratories, Inc., in New York City, but severed his connection with that organization in 1929. Later he conducted research in the use of polymerized vinyl chlorides for the Eastman Kodak Company.

Although his most notable achievements were in the development of synthetic rubber, for which he received a monetary award from the Czarist Government, Dr. Ostromislensky made valuable contributions in the fields of bacteriology, crystallography, photography and allergic diseases. Funeral services were held on January 19. He leaves a widow, son and daughter.

Alton L. Pardee

Alton L. Pardee, a cotton broker representing Curran & Barry since 1920, and prior to that an assistant purchasing agent for the B. F. Goodrich Co., died at his home in Stow, Ohio, at the age of 61 on January 19. A lifelong resident of Summit County, Ohio, Mr. Pardee entered the services of the Diamond Rubber Company as a messenger boy after leaving the Findley School. He rose to the position of purchasing agent until Diamond was merged with Goodrich and continued with Goodrich for a number of years as assistant purchasing agent. He was a member of the Fifty Year Club and also of Mt. Akra Lodge. Funeral services were held on January 21 with interment in Oakwood Cemetery. He leaves a widow, two sons and two daughters.

Charles A. Anderson

Charles A. Anderson, sales manager for the Anderson Rubber Co., Akron, died in the City Hospital of Akron on January 21 following an operation. He was a native of Barberton and had been associated with the Anderson concern for the past seventeen years. He was widely known in the trade and was in appearance at all the more important trade conventions. Funeral services were held on January 24 with interment in Westlawn Cemetery, Canton, Ohio. He leaves a widow.

Adam J. Killian

Adam J. Killian, president of the Killian Manufacturing Co., manufacturers of prophylactics in Akron, died at his home, 365 Rose Boulevard, Akron, on February 1 following an illness of four months. He was 56 years of age. A native of Millersburg, Ohio, Mr. Killian spent most of his life in Akron. He was one of a family of ten. Funeral services were held on February 4, with interment in Holy Cross Cemetery. He leaves a widow.

Frank H. Gilchrist

Frank H. Gilchrist, vice-president of the Flintkote Co., and of the Patent and Licensing Corporation, died of heart disease at his home in Pelham, N. Y., at the age of 59, on January 17. He graduated from the University of Chicago in 1902 and was a member of the Pelham Country Club and the Huguenot Yacht Club. He leaves a widow, a son and two daughters.

Push Rubber Mattresses

Having thoroughly tested their latex mattresses through industrial and institutional installations over a period of years, several leading rubber companies are now laying plans for strong consumer promotion of this relatively new product throughout 1938, according to a recent issue of *Advertising Age*. Dunlop, Firestone, Goodyear, Goodrich and U.S. Rubber are all in the latex mattress business. Although department stores have been stocking and selling these mattresses for three years or more, they have been advertised sparingly. One interesting aspect of this new industry, according to the story, is that U.S. Rubber is now in the business of making box springs to sell along with its mattresses, which require springs of this type rather than ordinary bed springs.

WORLD ABSORPTION DECLINED IN 1938

It is now estimated that world absorption of crude rubber in 1938 reached approximately 912,000 tons or 16.5% less than the 1,093,769 tons absorbed in the previous year. According to the Rubber Manufacturers Association, the United States absorbed only 411,363 tons, or 45% of the total. Absorption outside of the United States, with the December figure estimated at 45,000 tons, reached slightly more than 500,000 tons, a gain over the preceding year.

1938 was the second successive year in which absorption outside of the United States exceeded absorption of crude rubber in this country. This situation is largely due to the sharp contraction in domestic rubber use during the 1937-38 depression. In the last few months of 1938, however, American absorption caught up with the absorption abroad.

World absorption of crude rubber in November exceeded the 90,000 ton level for the first time since June, 1937. American figures for that month were reported at 46,048 tons by the Rubber Manufacturers Association and absorption abroad at 45,022 tons by the International Rubber Regulation Committee. November represented the third monthly gain in absorption abroad although the gain was not as sharp as that recorded in the United States.

While crude rubber absorption in this country in 1938 fell almost 25% behind the previous year, absorption in the United Kingdom declined only approximately 8%, based on eleven months' figures. Other importing countries for which no absorption figures are available but only net import figures, took approximately 10% less crude rubber last year than they did in 1937.

Rumanian Rubber Factory

A modern tire and tube factory, sponsored by Rumanian interests acting in conjunction with the Rumanian government, is now being constructed at Baicoiu, near Bucharest. It will be completed about April 1. The Banloc Manufacturing Company will operate the factory, all the equipment for which was purchased in the United States. Goodrich was selected by the new Rumanian company as its source of technical information and products of Goodrich quality will be produced in the new plant. Goodrich, however has no financial investment in the venture.

Canadian Sales Increase

According to a report recently issued by the Rubber Association of Canada, 1937 was the fifth consecutive year of increased sales of rubber products in both domestic and export markets. Sales of Canadian-made goods in 1937 reached $60,142,000 as compared with $49,114,000 in the preceding year. The approximate $11,000,000 increase was made up of $8,000,000 in domestic business and $3,000,000 in exports.

Los Angeles News

Paul W. Litchfield, president, Goodyear Tire and Rubber Company, and 17 company directors recently spent a few days in Los Angeles inspecting the plant after having met in conference in Southern Arizona near the Goodyear cotton acreage. Mr. Litchfield explained that the company owns 32,000 acres of long staple cotton in Southern Arizona and the idea was to meet where the men could talk shop near the source of supply. A good percentage of the cotton grown goes into tires manufactured in the Los Angeles plant. Mr. Litchfield stated that he was still much interested in zeppelins. He did not look for these, he said, to develop as instruments of warfare but he still has hopes of their commercial use in the future. The group returned East after the local plant inspection was completed.

The offer of the United States Rubber Company to purchase outstanding preferred and common stock of the Samson Corporation at $4 per share for the Class B common and $8 per share for the preferred was to culminate January 31, according to Preston D. Richards, attorney for the Samson minority stockholders' protective committee. On January 20 more than 90 per cent of the stock outstanding in the hands of the public had been turned in to the trust department of the Security-First National Bank of Los Angeles, the department named by the United States Rubber Company to handle the transfer. This means, Mr. Richards states, that the United States Rubber Company is now virtually sole owner of the Samson factory.

During the first week of January, 11,905,667 pounds of crude rubber, valued at $959,870, came in through the Los Angeles-Long Beach harbor. This is a marked increase over January, 1938, when for the entire month only 4,819,080 pounds, valued at $863,640, came in. It is thought that the rubber imports for the year will set a new high, according to Clarence H. Matson, manager of the foreign trade department of the Los Angeles Chamber of Commerce.

In 1937, it was pointed out by Mr. Matson, 142,868,000 pounds of crude rubber valued at $25,833,931 were imported, which is approximately $2,000,000 a month. The imports in 1938 dropped to 55,714,700 pounds, valued at $7,808,930. Figures show that the imports in crude rubber for the first week of January this year surpassed those of nine different months in 1938. November and December were the top months for 1938, the two together showing crude rubber imports of about $2,000,000 valuation.

One grandstand built on Colorado Street in Pasadena on New Year's day to hold a portion of the million and a half people who witnessed the Tournament of Roses parade headed by Shirley Temple was resting on a rubber "foundation." It is thought that this was the first grandstand ever so constructed.

The story is this: an ingenious young fellow with vision leased thirteen large trucks with flat bodies, and built a platform on them that accommodated approximately 500 chairs. The trucks in front were placed parallel with the sidewalk but those farther back were at right angles to the sidewalk and the seats at the rear were raised one tier above the other by tilting the platform. This was done by rearing up one end of each truck on a pile of railroad ties. The location was central.

This type of grandstand was given an official okay for strength and safety. Approximately 30 tons of human beings were seated on the platform, and these, with the weight of the platform and chairs, rested on about 100 tires. The idea has taken hold and it is expected that several grandstands next year will rest on rubber "foundations."

Section of the rubber "foundation" used for a Pasadena grandstand (see story above).

Disposes of Retail Outlets

Announcement has been made by the U. S. Tire Dealers Corporation that it has disposed of its last remaining company-owned stores and that its retail replacement tire business now follows a policy of distribution through independent dealers. The sale of the remaining stores marked the fulfillment of a policy adopted at the time of the formation of the U. S. Tire Dealers Mutual Corporation several years ago. According to H. N. Hawkes, general sales manager, the results to date have more than justified the policy. Mr. Hawkes also pointed out that the company has adopted a policy of line simplification.

Change Name of Journal

Due to the absorption of Upper-Hungary by Hungary proper, the name of the *Gumiipari Hirlap es Jarmugyartok Lapja* has been changed to the *Magyar Gumi Hirlap* (*Hungarian Rubber Journal*). The new name better signifies the national Hungarian character of the publication. Offices remain at V. Falk Miksa-U 4, Budapest, Hungary.

100 Years of Vulcanization

The current year represents the 100th anniversary of the discovery of vulcanization of Charles Goodyear. This column, itemizing incidents pertaining to the inventor's memory, will appear from time to time.

The Charles Goodyear Centennial Committee of Woburn, Mass., has issued an interesting booklet on the inventor's life called "A Yankee Centennial."

An article tracing Charles Goodyear's achievements, under the title of "Charles Goodyear—Inventor," written by Webster N. Jones, appears in the January, 1939, issue of *Chemical & Metallurgical Engineering*.

Goodyear Tire & Rubber Co. has launched an advertising program in trade and consumer papers built around the "Greatest Name in Rubber." Copy is largely devoted to "Charles Goodyear—the First Technician in Rubber."

The City of Woburn, Mass., will hold special commemorative exercises for Charles Goodyear on February 17. Further data can be secured from the Mayor of Woburn.

H. E. Simmons, president of the University of Akron, will trace the life of Goodyear and tell of the importance of his discovery to civilization at a banquet to be held in Akron on February 23 as part of the city-wide celebration in commemoration of the inventor's discovery.

New Rubber Goods

Goodrich Auto-Rail Tire

B. F. Goodrich Co., Akron, has announced a special Auto-Rail tire. Tires of this type have been furnished by the company for some time to the Evans Products Company of Detroit

for use on that concern's Auto-Railer and the new tire is a 32 x 6 heavy duty size, the size most commonly used on the Evans' vehicle, which is used by many railroads for branch line service and maintenance department work. Pneumatic tires of conventional design are not entirely satisfactory for this means of transportation, particularly when operating on rails in wet weather. The new Auto-Rail tire, therefore, utilizes a tread incorporating non-skid effectiveness.

Pennsylvania Shuttlecocks

Pennsylvania Rubber Co., Jeannette, Penna., is featuring a line of shuttlecocks for badminton under the tradenames of "Blue Goose," "Red Bird," and "Volley." These shuttlecocks are made from specially selected feathers, rubber, cork and other materials. Three single rows of stitching are said to as-

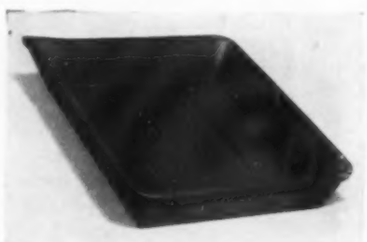
sure accuracy and to increase playing life. All of Pennsylvania's "birds" are manufactured under the direction of Jack Purcell, world's champion badminton player.

Rand Cumfy-Seat

Said to outlast three ordinary seats, a sponge rubber seat for babies has been introduced by the Rand Rubber Co., Brooklyn, N. Y., under the tradename of the Rand Cumfy-Seat. The new seat, scientifically designed for comfort and safety, can be tied on to high chairs and children's toilet seats. It is molded in one-piece and therefore has no irritating seams; is impervious to body odors and may be boiled with absolute safety or surface dirt removed with a damp cloth; gives firm cushioned support to the infant and does not lump, mat or "hollow"; and is non-heating so that the infant can sit on it comfortably without diapers or clothes.

Hard Rubber Photo Tray

American Hard Rubber Co., New York City, has introduced a line of hard rubber photo trays in two popular small sizes, *i.e.*, 5 x 7 inches and 8 x 10 inches. These trays, like those made by the company for professional use, are non-porous and non-corrosive, have chip-proof surfaces, are practically



indestructible, and are made with specially reinforced rims and bottoms to insure lasting strength. Use of the trays insures positive cleanliness in developing, fixing and washing, since hard rubber is totally unaffected by practically all acids and alkalies. The new trays are available plain or with molded medallion on the outside edge indicating their use. They sell for 60 cents for the smaller and 90 cents for the larger size.

Sponge Rubber Dice

A line of sponge rubber dice, in blocks of either 1½-inch or 2-inch cubes, with black dots on white rubber or white dots on black rubber, is being featured by the Faultless Rubber Co., Ashland, Ohio. The dice are soft and yielding, have no hard or sharp edges, and are made with rounded corners. They will not dent or scratch floors or furniture and come with a germ-proof finish. They can be thoroughly cleaned by washing.

Gasoline-Proof Hose

Two new types of gasoline curb pump hose, both of which contain a synthetic compound in the tube which makes it impervious to the action of gasoline,

have been announced by the Goodyear Tire & Rubber Co., Akron, Ohio. The constructions are identified as Style B H and Style W W H. Style B H contains a body of three cotton braids with a strand of copper wire interwoven with the middle braid which, when in contact with the fittings, disposes of any static electricity that may be built up. An abrasion and weather resisting cover is over the third braid. Style W W H has a circular woven jacket in the body which has interwoven in it a steel spring wire which functions to resist crush and eliminate static electricity. This style, too, has an abrasion and weather resisting cover. The use of the synthetic tube, in comparison to flexible metal lining in ordinary types of hose, is said to result in longer service life for the hose.

Cameron Oil-Proof Guard

The Cameron nozzle guard, described as a scientifically designed cushion which fits over the end of gasoline dispensing nozzles thus preventing any possibility of scratching the fenders of cars or chipping enamel from gas pumps, has been introduced by the Major Marketing Co., Inc., New York

City. The guard is made of "Thiokol," and is not affected by gasoline or oil. It will not deteriorate or swell and serves as positive insulation against static. It can be adopted on all types of pumps and is said to speed up filling time.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, FEBRUARY 9, 1939

Crude Rubber

CRUDE rubber prices have been erratic since our last report, climbing to 16.05 on January 19 (high for the period), dropping to 15.12 on January 26 (low for the period), recovering to 15.85 by the end of the month, and then showing tendency toward lower levels in the past few days. Continuous trade selling and commission house liquidation depressed the futures market considerably, quotations for futures on several trading days being several points under spot quotations. Acute weakness in the Far Eastern rubber market, occasioned by nervousness created by the European political situation and to apprehension over the future of the pound sterling and Dutch guilder, caused a sharp break in the price on January 26, from 15.64 to 15.12. After recovering as a result of factory buying, a wave of selling from many sources sent the price down 22 points today (February 9), from 15.60 to 15.38. Higher levels, however, are expected by the trade. Quotations in the outside market, Exchange, London and Singapore, follow:

As of February 9

Plantations—

Ribbed Smoked Sheets—			
No. 1 Spot	—	@	.15⅝
April-June	—	@	.15⅜
July-September	—	@	.15⅜
No. 2	—	@	.15⅛
No. 3	—	@	.14⅞
No. 4	—	@	.15½
Thin Latex Crepe	—	@	.15⅞
Thick Latex Crepe	—	@	.18
Brown Crepe, No. 1	—	@	.15⅛
Brown Crepe, No. 2	—	@	.14⅛
Amber Crepe, No. 2	—	@	.15
Amber Crepe, No. 3	—	@	.14¾
Brown Crepe, Rolled	—	@	.13¾

Latex—

Normal, per lb., carload lots	—	@	.18½

Paras—

Up-River, fine	—	@	.13⅛
Acre Bolivian, fine	—	@	.13¼

Balata—

Surinam sheet	—	@	.38

LONDON MARKET

Standard Smoked Sheets—Buyers—February 9			
April-June	7 3/4	@	7 13/16d
July-September	7 13/16	@	7 7/8d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—February 9			
April-June	—	@	7 1/16d
July-September	—	@	7 1/8d

Reclaimed Rubber

Demand on practically all grades of reclaim held up well last month and the trade expects a fair level of activity during the remainder of the current quarter. 12,269 tons of reclaim were consumed in December as compared with 12,668 in the preceding month, according to the Rubber Manufacturers Association. There has been no change in the price structure since our last report.

Shoe				
Unwashed	lb.	.06½	@	.06¾
Washed	lb.	.10	@	.10¼
Tube				
No. 1 (Floating)	lb.	.12	@	.12¼
No. 2 (Compounded)	lb.	.08	@	.08¾
Red tube	lb.	.08	@	.08¼
Tires				
Black (acid process)	lb.	.07	@	.07¼
Black, selected tires	lb.	.06	@	.06¼
Dark Gray	lb.	.09¼	@	.09¾
White	lb.	.11½	@	.12
Truck, Heavy Gravity	lb.	.05½	@	.06
Truck, Light Gravity	lb.	.07	@	.07½
Miscellaneous				
Mechanical blends	lb.	.04½	@	.05

Scrap Rubber

(Delivered Akron Mills)

A fair amount of trading in scrap rubber is reported, particularly in tire stocks. Increased foreign demand has served to bolster up the domestic price situation. Since our last report, price advances have occurred on auto tile peeling and mixed auto stocks. Current quotations follow:

(Prices to Consumers)

Auto tire peelings	ton	16.00	@18.00
Mixed auto	ton	12.00	@13.00
Beadless tires	ton	14.50	@16.00
Clean solid truck tires	ton	20.00	@22.50
Boots and shoes	ton	17.50	@19.00
Arctics, untrimmed	ton	13.00	@15.00
Inner tubes, No. 1	lb.	.07	@ .08
Inner tubes, No. 2	lb.	.03⅝	@ .03¾
Inner tubes, Red	lb	.03½	@ .03⅝

Cotton

Cotton prices have been comparatively steady since our last report, swinging in a 30-point range. High for the month was 9.10 on January 20; low 8.80 on January 11. Steadying factors in the market included good trade buying in the near months, commission house and foreign support, announcement of consumption of 565,000 bales of cotton in domestic mills which was considered constructive when compared with the 432,000 bales consumed in the same month of the previous year, and activity in futures. Both buying and selling orders were for the most part small and no large blocks of cotton seemed to be appearing. Reports from the South in recent weeks indicate tight conditions in spots. With about 100,000 bales a week going into the loan, interior supplies are believed to be somewhat scarce. Quotations for middling uplands on the Exchange follow:

	Jan. 11	February 9		
	Close	High	Low	Close
March	8.28	8.38	8.31	8.35
July	7.78	7.79	7.68	7.71
October	7.30	7.49	7.42	7.45

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.27¼	@	.27½
Peeler, carded, 23/4/3	lb.	.28¼	@	.28½
Peeler, carded, 15/3/3	lb.	.25¼	@	.25½
Peeler, carded, 13/3/3	lb.	.24¼	@	.24½
Egyptian, carded, 23/5/3	lb.	.40½	@	.40¾
Egyptian, combed, 23/5/3	lb.	.45½	@	.45¾
CHAFERS				
Carded, American, 1 1/16"	lb.	.27½	@	.27¾
Carded, American, 1"	lb.	.18	@	.23

Sheetings

48x40	36 in.	5.50	lb.	— @	.03½
40x40	36 in.	6.15	lb.	— @	.03⅝
40x36	36 in.	6.50	lb.	— @	.03
48x48	40 in.	2.50	lb.	— @	.06⅞
48x48	40 in.	2.85	lb.	— @	.06
56x60	40 in.	3.60	lb.	— @	.05½
48x44	40 in.	3.75	lb.	— @	.04¾
44x40	40 in.	4.25	lb.	— @	.04¾

Ducks

Enameling (single filling)	lb.	.21	@	.23
Belting and Hose	lb.	.25	@	—
Single filling, A grade	lb.	.09½	@	.12½
Double filling	lb.	.10½	@	.13½

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM JANUARY 11 TO FEBRUARY 9

Date	Spot	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Sales
Jan. 11	15.98	15.92	15.95	15.97	15.97	15.97	15.96	15.95	15.95	15.95	15.96	15.99	16.02	——	126
12	16.00	15.95	16.00	16.04	16.01	15.98	15.99	16.00	16.00	16.00	16.00	16.00	16.04	——	204
13	15.80	15.75	15.79	15.83	15.82	15.80	15.79	15.78	15.78	15.79	15.78	15.80	15.82	——	197
14	16.00	15.98	16.02	16.06	16.01	15.95	15.95	15.95	15.96	15.98	15.98	16.00	16.02	——	86
15															
16	16.00	15.97	16.00	16.03	16.00	15.95	15.95	15.94	15.95	15.96	15.97	15.99	16.01	——	154
17	15.95	15.85	15.92	15.98	15.93	15.86	15.86	15.85	15.86	15.84	15.85	15.85	15.86	——	223
18	15.88	15.77	15.83	15.90	15.85	15.80	15.80	15.80	15.82	15.83	15.80	15.81	15.80	——	205
19	16.05	16.00	16.05	16.09	16.04	15.98	15.97	15.95	15.95	15.96	15.95	15.95	15.96	——	217
20	16.05	15.98	16.03	16.08	16.03	15.97	15.95	15.93	15.94	15.95	15.95	15.95	15.95	——	155
21	15.90	15.85	15.90	15.95	15.89	15.83	15.83	15.82	15.82	15.81	15.81	15.81	15.82	——	62
22															
23	15.75	15.63	15.68	15.72	15.65	15.57	15.57	15.57	15.56	15.55	15.56	15.56	15.57	——	625
24	15.80	15.70	15.75	15.80	15.75	15.70	15.69	15.67	15.67	15.67	15.68	15.68	15.57	——	264
25	15.64	15.54	15.60	15.66	15.59	15.52	15.52	15.51	15.51	15.51	15.50	15.50	15.52	——	292
26	15.12	15.05	15.10	15.15	15.10	15.05	15.03	15.00	15.00	15.00	14.98	15.00	15.02	——	555
27	15.40	——	15.40	15.45	15.40	15.36	15.36	15.37	15.37	15.37	15.35	15.40	15.44	——	424
28	15.38	——	15.35	15.40	15.33	15.26	15.26	15.26	15.27	15.29	15.30	15.30	15.31	——	134
29															
30	15.70	——	15.67	15.72	15.66	15.60	15.59	15.58	15.60	15.62	15.60	15.63	15.65	——	180
31	15.85	——	15.75	15.89	15.83	15.71	15.74	15.74	15.73	15.71	15.71	15.71	15.72	——	184
Feb. 1	15.75	——	15.73	15.78	15.70	15.63	15.63	15.62	15.63	15.64	15.61	15.61	15.62	15.62	187
2	15.75	——	15.74	15.79	15.72	15.64	15.65	15.66	15.65	15.65	15.65	15.65	15.66	15.66	82
3	15.80	——	15.85	15.90	15.82	15.75	15.75	15.74	15.75	15.77	15.77	15.77	15.77	15.77	157
4	15.85	——	15.87	15.92	15.87	15.82	15.82	15.83	15.83	15.80	15.80	15.80	15.82	15.82	61
5															
6	15.77	——	15.80	15.85	15.80	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75	174
7	15.60	——	15.58	15.63	15.58	15.53	15.52	15.51	15.51	15.51	15.51	15.53	15.56	15.56	438
8	15.60	——	15.60	15.64	15.60	15.55	15.54	15.54	15.53	15.52	15.52	15.52	15.53	15.54	195
9	15.38	——	15.37	15.41	15.37	15.32	15.32	15.31	15.32	15.34	15.34	15.34	15.35	15.35	320

New York
February 10, 1939

Rubber CHEMICAL Markets

All Quotations F.O.B. Works Unless Noted

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.26 @	—
A-5-10	lb.	.35 @	.40
A-11	lb.	.52 @	.65
A-19	lb.	.52 @	.65
A-32	lb.	.70 @	.80
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
A-433	lb.	.45 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.55 @	.70
Butyl Zimate	lb.	3.00 @	—
Captax	lb.	.50 @	.60
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.36
El-Sixty	lb.	.57 @	—
Ethyl Zimate	lb.	3.00 @	—
Ethylidene aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.37½ @	.42
Guantal	lb.	.45 @	—
Heptene	lb.	.35 @	.40
Hexamethylenetetramine	lb.	.36 @	—
Lead Oleate, No. 999	lb.	.14 @	—
Witco	lb.	.15 @	—
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.36 @	.37
Monex	lb.	— @	2.65
Oxynone	lb.	.64 @	.80
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	2.50 @	—
Pipsolene	lb.	1.55 @	1.85
R & H 40	lb.	.40 @	.41
R & H 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-23	lb.	.40 @	—
Rotax	lb.	.60 @	.65
Safex	lb.	1.25 @	1.30
SPDX	lb.	.75 @	—
Super-Sulphur No. 1	lb.	.50 @	—
No. 2	lb.	.18 @	.20
Thiocarbanilid, drums	lb.	.24 @	—
Trimene	lb.	.55 @	.65
base	lb.	1.05 @	1.20
Triphenylguanidine	lb.	.45 @	—
Tuads	lb.	2.65 @	—
Ureka	lb.	.60 @	.75
Ureka Blend B	lb.	.60 @	.75
Ureka C	lb.	.56 @	.65
Vulcanex	lb.	.42 @	.43
Vulcone	lb.		
Vulcanol	lb.	.85 @	—
Z-88-P	lb.	.51 @	—
Zimate	lb.	2.65 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Compounding Materials)

Blues			
Prussian	lb.	.36 @	.37
Ultramarine	lb.	.15 @	—
Browns			
Mapico	lb.	.13 @	—
Umber, Turkey	lb.	.04 @	.04½
Greens			
Chrome	lb.	.21 @	—
Chromium Oxide, bbl.	lb.	.21 @	—
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	.45 @	—
sulfur, free	lb.	.48 @	.60
Indian English	lb.	.09 @	.10
Domestic (Maroon)	lb.	.11 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼ @	—
Whites			
Cryptone, No. 19	lb.	.05⅝ @	.06⅛
Cryptone CB, No. 21	lb.	.05⅝ @	.06⅛
Cryptone, ZS-20	lb.	.08⅛ @	.08⅝
Cryptone, ZS-86	lb.	.08⅛ @	.08⅝
Lithopone			
Albalith, black label—11	lb.	.04⅛ @	.04⅜
Azolith	lb.	.04⅜ @	.04¾
Ray-bar	lb.	.05⅞ @	.06⅛
Ray-cal	lb.	.05⅞ @	.06⅛
Rayox	lb.	.16 @	.19
Titanox A	lb.	.14 @	.17
Titanox B	lb.	.05⅝ @	.06⅝
Titanox C	lb.	.05⅝ @	.06⅝
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06¼ @	.06½
Anaconda, lead free	lb.	.06¼ @	.06½
Horsehead Lead Free Brand:			
Special—3	lb.	.06¼ @	.06½
XX Red—4	lb.	.06¼ @	.06½
XX Red—72	lb.	.06¼ @	.06½
XX Red—78	lb.	.06¼ @	.06½
XX Red—103	lb.	.06¼ @	.06½
Kadox, black label—15	lb.	.06½ @	.06¾
Blue label—16	lb.	.06½ @	.06¾
Red label—17	lb.	.06½ @	.06¾
St. Joe, black label	lb.	.06¼ @	.06½
green label	lb.	.06¼ @	.06½
red label	lb.	.06¼ @	.06½
U. S. P—7, bbls.	lb.	.09½ @	.09¾
Zinc Oxide—French Process			
Florence White seal—7 bbls.	lb.	.08½ @	.08¾
Green seal—8	lb.	.08 @	.08¼
Red seal—9	lb.	.07½ @	.07¾
Yellows			
Cadmolith	lb.	.50 @	.55
Chrome	lb.	.14½ @	.15½
Mapico	lb.	.09½ @	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.0275 @	.0625
Bone, powdered	lb.	.05½ @	.14
Carbon, compressed	lb.	.0275 @	.0625
uncompressed	lb.	.0275 @	.0625
"Certified"	lb.	— @	—
"Spherons"	lb.	— @	—
"Disperso"	lb.	.0275 @	.0625
"Excello," compressed	lb.	.0275 @	.0625
"Fumonex"	lb.	.0275 @	.0625
"Gastex"	lb.	.0275 @	.0625
Lampblack	lb.	.07 @	.12
"Micronex"	lb.	.0275 @	.0625
"Supreme"	lb.	.0275 @	.0625
Thermatomic—"P 33"	lb.	.04¾ @	.07¾
"Thermax"	lb.	.01¾ @	.05
United "Dixie" & "Kosmos"	lb.	.0275 @	.0625

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85 @	24.50
Ammonia carbonate, lump	lb.	.10½ @	.12
Asbestine	ton	13.00 @	15.00
Barium carbonate (98-100%)	ton	— @	—
Barium Dust	lb.	.05 @	.06
Barytes	ton	23.65 @	31.15
Basofor	lb.	.04½ @	—
Bentonite	lb.	.02 @	.03
Blanc fixe dry f.o.b. works	ton	60.00 @	65.00
Calcene	ton	37.50 @	45.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	45.40 @	60.00
heavy	ton	45.00 @	55.00
Clay, Kaolin, domestic	ton	7.50 @	15.00
Aerfloted, Suprex	ton	9.50 @	21.00
Congaree	ton	9.50 @	—
Crown (f.o.b. plant)	ton	9.50 @	—
Dixie	ton	11.00 @	30.00
Dixie, Jr.	ton	9.50 @	29.00
McNamee	ton	9.50 @	22.00
Par	ton	9.50 @	22.00
Witco	ton	9.50 @	—
Cotton Flock	lb.	.11 @	.15
Glues, extra white	lb.	.28 @	.30
medium white	lb.	.14 @	.19
Kalite No. 1	ton	24.00 @	50.00
Kalite No. 3	ton	34.00 @	60.00
"Lime Crest" Industrial Filler No. 100	lb.	— @	—
Magnesium carbonate	lb.	.07½ @	—
Mica	ton	35.00 @	44.00
Pyrax A	ton	7.50 @	20.00
Rottenstone (powdered)	lb.	.02½ @	.05
Soapstone, powdered	ton	16.00 @	22.00
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	17.00 @	20.00
Whiting, commercial	ton	17.00 @	18.00
Columbia Filler	ton	9.00 @	14.00
English Cliffstone	ton	33.00 @	43.00
Witco	ton	6.00 @	—
Wood Flour	ton	20.00 @	25.00
Zinc Carbonate	lb.	— @	.10¾
Zinc Stearate	lb.	.23 @	—

MINERAL RUBBER

285°-300° Mineral Rubber	ton	22.00 @	42.00
Black Diamond	ton	27.00 @	—
Genasco, solid (factory)	ton	25.00 @	27.00
Hard Hydrocarbon	ton	22.00 @	42.00
Parmr, solid	ton	25.00 @	—
Pioneer, MR, solid	ton		
Pioneer-granulated	ton		

MISCELLANEOUS

Aromatics—Rodo #0	lb.	3.50 @	4.00
Rodo #10	lb.	4.50 @	5.00
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors No. 5145	lb.	2.00 @	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.40 @	—
Darvan (dispersing agent)	lb.	.30 @	.50
Santomerse (dispensing, wetting, penetrating and stabilizing agent)	lb.	.13 @	—
Sunproof	lb.	.23 @	.25
Sponge Paste	lb.	— @	.80
Tackol (tackifier)	lb.	.115 @	—
Tonox	lb.	.52 @	.61

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.53 @	2.78
Nitric, 36 degrees	cwt.	5.00 @	6.00
Sulfuric, 66 degrees	ton	15.50 @	16.50
Acids, Fatty			
Laurex	lb.	.12 @	.14
Stearex Beads	lb.	.08 @	.09
Stearic, double pressed	lb.	.12½ @	.13½
Stearite	lb.	.10½ @	.11¾
Alkalies			
Caustic Soda, 76%	cwt.	3.15 @	3.80
Soda Ash, 58%, C.L.	cwt.	— @	2.35
Oils			
Cycline Oil	gal.	.20 @	—
Degras, bbls.	lb.	.07¾ @	.08
Fluxrite	lb.	.05½ @	.06½
Palm Niger	lb.	.05½ @	.06½
Para-Flux	gal.	.17 @	—
Petrolatum, light	lb.	.03½ @	.03¾
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
Pine, steam distilled	gal.	.64 @	.69
dest. dist., drums	gal.	.49 @	.50
Rosin Oil, cmpd.	gal.	.40 @	—
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rubtack	lb.	.08 @	.10
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	.07 @	—
Witco Softener No. 20	gal.	.20 @	—
Wonurn No. 8, c.l.	lb.	.06 @	—
Wobonite, c.l.	lb.	.05 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.05½ @	.06½
coal tar	ton	19.00 @	22.00
hardwood	ton	16.00 @	22.50
pine, 200 lb. gr. wt.	bbl.	6.00 @	6.50
Pigmentar, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
R. S. L. Resin	lb.	— @	—
Retort Pine Tar, drums	ton	20.00 @	26.00
Solvents			
Acetone, pure	lb.	— @	.06¾
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.33 @	.39
Benzene, 90%	gal.	.18 @	.23
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.65
Carbon, bisulfide	lb.	.05¼ @	.08
Carbon tetrachloride	lb.	.05½ @	.08
Dichlorethylene	lb.	— @	.25
Dipentene, cml., drums	gal.	.41 @	.50
Dryolene (f.o.b. Okla.)	gal.	.10 @	.10½
Ethylene dichloride	lb.	.05½ @	.06½
Plastogen	lb.	.07¾ @	.12½
Reogen (drums)	lb.	.11½ @	.20
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Trichlorethylene	lb.	— @	.09½
Turpentine, spirits	gal.	.43 @	.47
dest. dist., drums	gal.	.33 @	.41
Waxes			
Beeswax, white	lb.	.39 @	.45
Carnauba, yellow	lb.	.46 @	.47½
Ceresin, white, dom.	lb.	.08 @	.11
Montan, crude	lb.	.10¾ @	.11¾
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.02¾ @	—
White crude scale 124/126	lb.	.02¾ @	.03
Refined, 122/127	lb.	.04½ @	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.50 @	2.10
Exel	lb.	1.00 @	1.40
Gel	lb.	.57 @	.77
Hipar	lb.	.65 @	.92
Powder	lb.	.52 @	.73
Resin	lb.	.52 @	.73
Resin D	lb.	.52 @	.73
White	lb.	1.25 @	1.75
Albasan	lb.	.70 @	.75
Antox	lb.	.56 @	.58
B-L-E	lb.	.52 @	.61
Flectol H	lb.	.54 @	—
Flectol White	lb.	1.00 @	—
Flectol B	lb.	.54 @	—
Neozone	lb.	.63 @	—
Oxynone	lb.	.68 @	—
Perflectol	lb.	.67 @	.75
Retardex	lb.	.35 @	.40
Santoflex A	lb.	— @	—
Santoflex B	lb.	.54 @	—
Stabilite	lb.	.57 @	.62
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.52 @	.61

MOLD LUBRICANTS

Aresklene	lb.	— @	—
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.08
Lubrex	lb.	.25 @	.30
Mold Paste	lb.	.18 @	—
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rusco, f.o.b. Nitro	lb.	.12 @	.30
Sericite, f.o.b. N. Y.	ton	65.00 @	—
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.19 @	—
Black	lb.	.07 @	.11
White	lb.	.08 @	.12
Brown	lb.	.07 @	.11
Neophax	lb.	.10¼ @	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.07½ @	.15
Sulfur Chloride, yellow (drs.)	lb.	.04 @	—
Sulfur flour,			
Refined, 100% pure (bags)	cwt.	2.50 @	3.65
Commercial (bags)	cwt.	1.60 @	2.35
Telloy	lb.	2.00 @	—
Vandex	lb.	2.00 @	—

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,362	185,060,304	26.71	8,772	5,672,319	28.87	300,590
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1937:							
Nov.	51,958	19,905,523	17.01	159	66,501	18.72	51,799
Dec.	68,006	24,934,206	16.37	290	91,764	14.14	67,716
1938:							
Jan.	43,984	15,115,732	15.34	325	118,514	16.27	43,659
Feb.	39,380	13,095,429	14.85	305	109,756	16.08	39,075
Mar.	41,592	13,494,654	14.48	646	198,865	13.74	40,946
Apr.	31,042	9,495,476	13.66	250	75,797	13.55	30,792
May	27,229	8,010,250	13.13	528	167,831	14.20	26,701
June	25,983	7,150,115	12.29	399	116,458	13.03	25,584
July	21,771	5,723,381	11.74	420	127,522	13.54	21,351
Aug.	30,798	8,477,231	12.29	432	133,350	13.79	30,366
Sept.	34,383	10,650,107	13.83	803	242,324	13.48	33,580
Oct.	33,449	10,945,896	14.61	621	196,523	14.14	32,828
Nov.	31,903	10,572,345	14.79	415	146,276	15.73	31,488
Dec.	36,031	12,601,926	15.61	424	141,364	14.87	35,607

* Revised.

Note: "Gross Imports" do not include latex or guayule. To secure more accurate figures for "Net Imports" latex and guayule figures (shown below) should be added and the re-export figure deducted from the total. Annual figures for 1922, however, include both latex and guayule; guayule only is included in 1923. Annual figures for 1922-36 were revised in February, 1937.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule: Tons	Guayule: Dollars	Balata: Tons	Balata: Dollars	Jelutong: Tons	Jelutong: Dollars	Liquid Latex (1): Tons	Liquid Latex (1): Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1937:								
Nov.	251	69,452	29	9,374	593	194,889	2,085	875,074
Dec.	140	34,347	31	11,491	1,325	470,553	1,804	694,164
1938:								
Jan.	538	147,685	23	8,958	598	224,443	1,400	494,242
Feb.	218	60,097	33	11,393	892	355,080	1,684	560,883
Mar.	150	41,518	69	19,454	587	239,271	979	327,844
Apr.	188	50,423	66	25,741	1,265	444,756	889	295,690
May	229	61,756	29	8,806	900	274,652	879	279,502
June	150	41,518	34	11,496	918	276,126	695	214,420
July	223	49,099	51	16,130	869	267,491	634	209,526
Aug.	250	53,285	41	13,637	526	159,784	876	308,573
Sept.	173	37,954	39	13,896	740	225,161	683	235,242
Oct.	126	27,692	45	20,641	614	163,635	876	347,348
Nov.	59	12,923	66	24,725	307	76,452	1,020	394,082
Dec.	181	39,869	13	6,263	917	237,653	1,263	479,966

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

	1931*	1932*	1933*	1934*	1935*	1936*	1937*	1938
Jan.	28,640	29,648	22,645	39,190	46,636	48,631	50,879	29,429
Feb.	28,880	31,821	21,392	40,515	42,720	36,841	51,950	23,868
Mar.	32,883	29,505	17,843	47,003	42,153	42,813	54,129	30,487
Apr.	33,418	27,518	25,928	44,853	44,247	52,031	51,859	27,984
May	37,927	30,957	44,074	42,918	41,101	50,612	51,795	28,947
June	38,027	41,475	50,743	40,147	36,156	52,772	51,860	30,629
July	32,030	29,976	49,614	32,553	35,917	48,250	43,703	32,209
Aug.	27,666	23,721	44,428	33,216	38,775	46,777	41,506	38,170
Sept.	23,707	23,847	35,281	30,258	37,086	46,449	43,945	37,823
Oct.	22,342	22,286	31,543	31,253	41,969	49,637	38,754	40,333
Nov.	23,010	23,231	28,831	34,748	42,310	50,433	34,025	46,169*
Dec.	21,470	18,015	28,757	36,569	42,474	49,754	29,195	45,315
Tot.	350,000	332,000	401,079	453,223	491,544	575,000	543,600	411,363

* Revised.

Note: Figures for 1931-1937 were revised in May, 1938, and are now based on Department of Commerce survey figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks*	Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks*
1929	218,954	226,588	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,000	1935	122,948	113,078	23.0	25,069
1931	133,351	124,126	33.9	19,257	1936	150,571	141,486	24.6	19,000
1932	75,608	77,504	23.4	16,354	1937*	185,033	162,000	29.8	28,800
1933	99,560	81,602	19.9	20,746	1938	113,482	113,341	27.6	21,769

Figures on Monthly Basis

1937:									
Jan.*	15,129	14,450	28.4	18,822	July	16,241*	12,128*	27.8*	17,682*
Feb.*	15,192	14,578	28.1	18,490	Aug.	16,543*	13,227*	31.9*	19,706*
Mar.*	14,462	15,601	28.9	16,450	Sept.	16,410	13,681	37.4	21,597
Apr.	13,884	15,607	30.1	14,046	Oct.	15,849	12,234	31.6	23,572
May	15,793	14,693	28.4	14,647	Nov.	12,406	9,703	28.6	24,620
June	16,052	14,414	27.8	14,535	Dec.	10,815	7,674	26.3	26,260
1938:									
Jan.*	7,698	6,940	23.6	28,900	July	7,109	8,273	25.7	18,832
Feb.*	6,198	7,141	29.9	27,487	Aug.	10,472	10,732	28.1	17,892
Mar.*	6,875	8,471	27.8	25,432	Sept.	12,016	11,281	29.8	18,127
Apr.	6,399	7,480	26.7	23,339	Oct.	13,558	11,803	29.3	19,090
May	6,866	8,009	27.7	22,275	Nov.	13,995	12,668	27.5	19,823
June	7,584	8,274	27.0	21,040	Dec.	14,712	12,269	27.1	21,769

* Stocks on hand at the end of month or year.

* Revised.

Note: Figures for 1936 were revised on June 1, 1937, and are now based on Department of Commerce survey figures.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1936*	1937*	1938		1936*	1937*	1938
January	32,344	33,668	35,176	August	46,061	49,598	50,459
February	27,178	32,034	31,861	September	44,366	47,515	46,058
March	35,864	40,524	41,259	October	44,163	45,446	46,272
April	38,864	43,461	43,254	November	39,954	42,718	44,991
May	42,010	45,407	44,911	December	39,590	39,465	41,649
June	44,522	48,447	48,293				
July	46,865	51,069	47,474	Total	481,606	519,352	521,657

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1927	19,700,003	1931	11,253,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,192
1929	24,141,502	1933	8,713,962	1937	22,257,964
1930	17,364,096	1934	12,255,118	1938	10,612,138

1938		1938		1938	
January ...	527,899	May	706,188	September .	819,089
February ..	477,600	June	527,121	October ...	1,312,094
March	854,031	July	406,419	November ..	1,722,769
April	970,545	August	467,506	December ..	1,817,769

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1936																																
Nov.	—	17⅝	—	17⅝	17⅝	17⅞	17⅞	19⅛	17⅝	17¾	—	17⅝	17¾	17⅞	—	18⅛	18⅝	18⅝	18¼	18¼	18¼	—	18⅜	18¼	18¼	—	—	18⅛	—	18½	—	18
Dec.	18½	18⅝	18⅝	19	19⅛	—	19⅛	19⅛	19⅛	19⅝	19	—	—	19⅝	19⅛	20⅛	20⅝	20⅝	20⅞	—	20¼	20⅜	20⅜	20⅜	22⅝	—	—	23	21¾	21⅛	21⅛	20
1937																																
Jan.	—	—	21⅛	20⅞	20⅜	21⅜	21⅛	21⅛	22⅜	—	22⅝	23⅞	—	21⅛	21⅛	21⅞	—	21⅞	20⅛	21⅞	20⅛	—	20⅝	20⅝	—	21⅜	21⅛	21⅛	21⅛	21⅞	—	21⅜
Feb.	21	21⅛	21⅛	21⅛	21⅛	21⅝	—	—	21⅝	21⅝	23⅜	23⅞	23⅛	23⅜	23⅜	21⅞	21⅞	21⅞	20⅛	24⅜	24⅜	24⅞	24⅜	23⅞	23⅞	23⅞	21⅞	21⅞	21⅞	21⅞	—	21⅝
Mar.	21⅛	21⅛	21⅛	21⅛	22⅛	22⅛	22⅛	22⅛	24⅞	23⅞	23⅞	23⅞	23⅞	24⅞	24⅞	22⅝	22⅝	24⅞	22⅝	24⅛	24⅛	22⅝	23	23⅞	22⅝	22⅝	26⅛	26⅛	26⅝	26⅝	26½	24⅞
April	20⅝	21⅛	26⅛	23	23	24⅛	24⅛	24⅛	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞
May	20⅝	20⅝	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛
June	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛
July	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝
Aug.	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝
Sept.	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝
Oct.	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝
Nov.	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞
Dec.	15	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
1938																																
Jan.	—	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	—	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	—	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝
Feb.	14⅝	14⅝	14⅝	14⅝	14⅝	—	—	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝
Mar.	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝
April	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝
May	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝
June	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝
July	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝
August	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
Sept.	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½	16½
Oct.	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝
Nov.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Dec.	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞
1939																																
Jan.	—	—	16½	16⅜	—	16	16	—	—	—	15⅛	15⅜	15⅛	—	—	15⅞	15¾	15⅛	15⅛	15⅞	15¾	—	15⅞	15⅜	—	—	—	—	—	—	—	—
Feb.	15⅜	15⅜	15⅜	15⅜	15⅛	—	15⅛	15⅞	15⅛	15¾	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1911-1931

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.55
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	11.98
1915	65.85	1919	48.70	1923	29.45	1927	37.72	1931	6.17

Average Monthly Price per Pound Since 1932

	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents	1939 Cents
Jan.	4.38	3.08	9.32	13.10	14.35	21.37	14.63	15.75
Feb.	4.03	2.95	10.45	12.92	15.48	21.33	14.71	
Mar.	3.35	3.01	11.01	11.51	15.89	24.09	13.55	
Apr.	3.02	3.56	12.10	11.55	15.98	23.44	11.84	
May	3.09	4.95	13.26	12.05	15.62	21.14	11.57	
June	2.66	6.15	13.51	12.57	15.85	19.29	12.57	
July	2.89	8.01	14.60	12.10	16.49	18.86	15.37	
Aug.	3.63	7.31	15.47	11.98	16.25	18.37	16.08	
Sept.	3.84	7.30	15.36	11.55	16.46	18.55	16.15	
Oct.	3.65	7.64	13.96	12.62	16.55	16.28	16.89	
Nov.	3.44	8.66	13.04	13.15	17.97	14.60	16.24	
Dec.	3.24	8.87	12.98	13.28	20.01	15.41	16.05	
Average for Year	3.49	5.96	12.92	12.37	16.41	19.39	14.64	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1938 Nov.	1938 Dec.	1939 Jan.	1939 Feb.	Day	1938 Nov.	1938 Dec.	1939 Jan.	1939 Feb.
1	8¼	8	—	7 11/16	17	7 15/16	8	7 7/8	
2	8¼	7 15/16	—	7 3/4	18	7 15/16	—	7 15/16	
3	8 15/16	7 15/16	8 3/8	7 13/16	19	7 7/8	8 1/16	8	
4	8 3/8	—	8 3/8	7 11/16	20	—	8 1/16	7 15/16	
5	8 1/16	7 15/16	8 1/16	—	21	7 15/16	8 1/16	7 15/16	
6	—	7 15/16	8 1/8	7 7/8	22	7 15/16	8 1/16	—	
7	8 3/8	7 15/16	8 1/16	7 13/16	23	7 15/16	8 1/8	7 15/16	
8	8 3/8	7 15/16	—	7 11/16	24	7 15/16	—	7 15/16	
9	8 3/8	7 15/16	8 1/16	7 11/16	25	8	—	7 3/4	
10	8 3/8	—	8 1/16	—	26	8	—	7 1/2	
11	8 1/16	—	8 1/16	—	27	—	—	7 5/8	
12	8 1/16	8	8	—	28	7 7/8	8 1/16	7 5/8	
13	—	7 15/16	7 15/16	—	29	7 15/16	8 1/16	—	
14	8 1/16	8	7 15/16	—	30	7 15/16	8 1/16	7 11/16	
15	8 1/16	8	—	—	31	—	—	7 7/8	
16	8 1/16	8	8	—					

Average Monthly Price Per Pound

Month	1936 Pence	1937 Pence	1938 Pence	1939 Pence	Month	1936 Pence	1937 Pence	1938 Pence	1939 Pence
Jan.	[illegible]	[illegible]	7.077	7.926	Aug.	7.581	8.830	7.841	
Feb.	7.255	10.503	7.029		Sept.	7.577	8.935	7.918	
Mar.	7.450	11.766	6.590		Oct.	7.898	7.855	8.355	
Apr.	7.502	11.471	5.793		Nov.	8.572	7.080	8.111	
May	7.335	10.250	5.632		Dec.	9.580	7.332	8.005	
June	7.352	9.548	6.147		Average for Year	7.713	9.424	7.164	
July	7.696	9.136	7.464						

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1938 Dec.	1939 Jan.	1939 Feb.	Date	1938 Dec.	1939 Jan.	1939 Feb.	Date	1938 Dec.	1939 Jan.	1939 Feb.
1	8.95	—	8.99	11	—	8.80		22	8.85	—	
2	8.75	—	8.99	12	8.66	8.85		23	8.82	9.01	
3	8.59	8.94	9.04	13	8.58	8.83		24	—	9.03	
4	—	8.92	9.06	14	8.65	8.92		25	—	9.04	
5	8.60	8.91	—	15	8.68	—		26	—	8.97	
6	8.69	8.85	9.05	16	8.62	8.93		27	8.78	8.98	
7	8.72	8.91	9.01	17	8.66	9.01		28	8.91	9.00	
8	8.66	—	8.99	18	—	9.00		29	8.85	—	
9	8.57	8.80	8.95	19	8.72	9.05		30	8.83	8.90	
10	8.68	8.78		20	8.76	9.10		31	—	8.95	
				21	8.79	9.09					

Average Monthly Price Per Pound

	1936 Cents	1937 Cents	1938 Cents	1939 Cents		1936 Cents	1937 Cents	1938 Cents	1939 Cents
Jan.	11.91	13.06	9.57	8.94	Aug.	12.28	10.41	8.41	
Feb.	11.53	13.15	8.91		Sept.	12.31	9.02	8.17	
Mar.	11.43	14.46	8.92		Oct.	12.30	8.42	8.61	
Apr.	11.71	14.23	8.76		Nov.	12.23	7.96	9.08	
May	11.68	13.34	8.50		Dec.	12.83	8.26	8.72	
June	12.02	12.70	8.38		Average for Year	12.11	11.44	8.66	
July	13.11	12.26	8.85						

ADVERTISING PAGES REMOVED

Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of	ON HAND 1936	ON HAND 1937	ON HAND 1938	AFLOAT 1936	AFLOAT 1937	AFLOAT 1938	ON HAND AND AFLOAT 1936	ON HAND AND AFLOAT 1937	ON HAND AND AFLOAT 1938
Jan.	296,683	204,436	274,581	43,870	55,096	57,356	340,553	259,532	331,937
Feb.	293,631	195,692	294,338	46,532	53,538	47,459	340,163	249,230	341,797
Mar.	284,561	192,980	299,172	58,935	56,994	41,882	343,496	249,974	341,054
Apr.	277,478	176,289	301,436	47,678	72,530	39,071	315,156	248,819	340,507
May	262,415	175,273	299,720	48,860	58,542	32,859	311,275	233,815	332,579
June	245,544	172,056	294,566	47,228	57,215	32,079	292,872	229,271	326,645
July	235,850	167,094	284,914	60,343	75,779	40,400	296,193	242,873	325,314
Aug.	230,167	174,195	277,463	63,597	80,439	47,772	293,764	254,634	325,235
Sept.	233,336	186,193	276,586	62,240	83,288	48,927	295,576	269,481	325,513
Oct.	224,000	200,025	269,937	67,825	80,653	51,062	291,825	280,678	320,999
Nov.	211,480	222,707	254,196*	73,691	81,302	51,114	285,171	304,009	305,310*
Dec.	223,000	262,204	245,413	56,567	63,099	45,105	279,567	325,303	290,518

* Revised.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1936	London 1937	London 1938	Liverpool 1936	Liverpool 1937	Liverpool 1938
January	84,791	29,005	40,203	77,188	41,895	21,711
February	79,757	26,508	46,596	77,138	37,078	24,737
March	74,779	21,292	50,233	72,823	30,622	26,220
April	68,932	21,128	54,296	71,388	27,443	28,277
May	61,349	21,351	57,194	69,150	25,081	29,862
June	55,993	21,964	60,307	66,173	21,258	31,837
July	49,575	22,589	62,236	63,715	19,424	32,825
August	45,749	25,211	65,113	62,367	19,817	34,315
September	44,364	28,462	63,321	59,485	21,190	34,645
October	40,777	30,465	59,609	55,738	21,327	33,483
November	37,495	33,304	57,794	51,184	21,399	32,116
December	33,027	35,633	55,668	45,291	21,978	31,012

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [2]	Holland	Para and Manaos
At end of 1938					
January	48,494*	49,643	5,976	131	2,024
February	46,241	47,990	5,653	169	2,342
March	50,797	48,473	5,490	180	1,212
April	40,614	45,008	4,812	155	1,083
May	40,598	45,426	4,876	169	816
June	44,729	49,290	4,488	190	904*
July	45,529	52,081	5,014	711	944
August	41,002	49,922	4,659	672	1,032
September	35,386	53,815	5,339	662	1,599
October	34,901	54,720	4,916	669	1,402
November	31,255	54,283	4,409		2,267

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

End of:	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
1937				
October	80,653	35,000	19,347	135,000
November	81,302	39,100	6,598	127,000
December	63,099	45,100	26,801	135,000
1938				
January	57,356	40,500	15,144	113,000
February	47,459	44,200	16,341	108,000
March	41,882	44,700	22,418	109,000
April	39,071	42,960	31,969	114,000
May	32,859	40,600	20,541	94,000
June	32,079	42,580	17,341	92,000
July	40,400	39,150	25,450	105,000
August	47,772	34,500	18,728	101,000
September	48,927	29,200	17,873	96,000
October	51,062	26,100	21,838	99,000
November	51,114	23,000	17,886	92,000
December	45,105	20,000	14,895	80,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate.

TOTAL PRINCIPAL WORLD STOCKS

(Figures from the Survey of Current Business)

At end of	1933	1934	1935	1936*	1937	1938
January	634,797	661,948	698,153	600,479	454,249*	551,632*
February	626,227	663,308	686,195	599,355	445,265*	569,242*
March	638,428	666,382	678,809	583,318	447,856*	591,968
April	629,159	658,796	677,006	567,172	428,249*	593,340
May	626,537	689,236	677,569	541,871	413,134*	577,063*
June	613,055	672,804	671,525	520,255	434,250*	583,952
July	618,258	676,200	679,061	519,074	445,782	593,481
August	617,449	674,702	680,644	500,520	457,462*	580,489*
September	623,683	694,361	661,509	493,585	470,768*	568,902*
October	636,597	680,616	655,000	486,159	479,398*	560,948
November	642,968	684,408	617,300*	466,491	493,266*	535,169*
December	654,890	705,975	613,987*	466,576	545,533*	508,532
Monthly Avge.	630,171	677,395	666,397*	528,738	460,022*	567,893

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Production Figures on Quarterly Basis — Quarter	1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	12,323	11,004	6,635	13,437	13,355	11,798	16,142	7,714
Apr.-June	16,295	12,980	14,412	13,565	12,597	15,443	16,421	8,570
July-Sept.	12,004	9,245	14,707	9,822	11,312	15,467	12,659	11,416
Oct.-Dec.	8,117	6,856	9,550	10,406	12,099	15,409	10,063	12,930
Total	48,739	40,085	45,304	47,230	49,363	58,117	55,285	37,718

Shipment Figures on Quarterly Basis — Quarter	1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	11,268	8,760	6,981	10,730	11,154	10,944	14,667	7,716
Apr.-June	15,919	18,021	15,139	14,998	13,473	16,530	16,324	10,745
July-Sept.	14,354	8,141	13,707	11,648	13,489	14,558	13,591	11,936
Oct.-Dec.	8,510	5,329	8,265	9,310	12,066	13,331	10,864	12,757
Total	50,051	40,251	44,092	46,686	50,182	55,363	55,446	40,387

Inventory Figures [2] — Quarter	1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar	10,014	9,878	7,290	11,651	11,675	9,087	12,488	10,808
Apr.-June	10,447	4,999	6,615	10,219	10,755	7,835	12,529	8,763
July-Sept.	8,158	6,096	7,595	8,419	8,288	9,012	11,615	8,406
Oct.-Dec.	7,775	7,644	8,888	9,455	8,196	11,114	10,767	8,498

Figures for Recent Months

	PRODUCTION 1936	PRODUCTION 1937	PRODUCTION 1938	SHIPMENTS 1936	SHIPMENTS 1937	SHIPMENTS 1938	INVENTORY [2] 1936	INVENTORY [2] 1937	INVENTORY [2] 1938
Oct.	5,126	3,985	4,134	4,082	3,951	4,144	10,096	11,644	8,237
Nov.	4,972	3,120	4,117	4,233	3,777	4,442	10,823	10,963	7,924
Dec.	5,311	2,959	4,679	5,016	3,156	4,171	11,114	10,768	8,498

AUTOMOBILE INNER TUBES

Production Figures on Quarterly Basis — Quarter	1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	11,989	10,721	6,230	12,823	12,553	11,935	15,714	6,938
Apr.-June	15,388	11,913	13,001	13,191	11,631	14,678	15,299	7,177
July-Sept.	12,839	8,286	14,356	10,321	11,270	15,377	11,949	10,462
Oct.-Dec.	8,117	5,970	9,000	9,891	12,425	15,257	9,024	12,131
Total	48,333	36,890	42,587	46,226	47,879	57,247	51,986	37,718

Shipment Figures on Quarterly Basis — Quarter	1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	11,251	8,918	6,539	10,640	11,252	11,410	14,498	6,969
Apr.-June	15,314	16,271	13,292	14,553	11,928	15,169	15,381	9,301
July-Sept.	15,282	7,761	13,370	11,545	13,251	15,125	12,805	10,541
Oct.-Dec.	8,174	4,961	8,189	8,306	11,636	12,921	9,693	12,085
Total	50,021	37,911	41,390	45,044	48,067	54,625	52,377	40,387

Inventory Figures [2] — Quarter	1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	10,475	9,448	6,369	10,244	10,406	8,692	11,904	10,093
Apr.-June	10,504	5,174	6,097	8,795	10,050	8,105	11,746	8,108
July-Sept.	8,095	5,753	7,008	7,639	7,565	8,627	11,242	7,907
Oct.-Dec.	7,922	6,749	7,815	9,180	8,231	10,985	10,235	8,061

Figures for Recent Months

	PRODUCTION 1936	PRODUCTION 1937	PRODUCTION 1938	SHIPMENTS 1936	SHIPMENTS 1937	SHIPMENTS 1938	INVENTORY [2] 1936	INVENTORY [2] 1937	INVENTORY [2] 1938
Oct.	5,397	3,772	3,924	4,108	3,499	4,125	9,977	11,103	7,737
Nov.	4,739	2,870	3,944	3,995	3,334	4,122	10,732	10,527	7,587
Dec.	5,121	2,382	4,263	4,819	2,859	3,838	10,985	10,236	8,061

[1] Based on reports received from the Rubber Manufacturers Association.
[2] Held by manufacturers at end of period indicated.

Note: Annual figures for 1938 are accurate. Monthly figures will be revised to correspond when made available by the Rubber Manufacturers Association.

Automobile Production

	United States Total	United States Passenger Cars	United States Trucks	Canada Total	Canada Passenger Cars	Canada Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936*	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937*	4,808,974	3,915,889	893,085	207,463	153,046	54,417	5,016,437
1938	2,489,635	2,000,985	488,650	166,142	125,081	41,061	2,655,777
1938*							
Apr.	219,310	176,078	43,232	18,819	14,033	4,786	238,129
May	192,059	154,958	37,101	18,115	13,641	4,474	210,174
June	174,670	136,531	38,139	14,732	11,014	3,718	189,402
July	141,443	106,841	34,602	9,007	5,273	3,734	150,450
Aug.	90,494	58,624	31,870	6,452	3,063	3,389	96,946
Sept.	83,534	65,159	18,375	6,089	4,290	1,799	89,623
Oct.	209,512	187,494	22,018	5,774	5,412	362	215,286
Nov.	372,413	320,344	52,069	17,992	15,423	2,569	390,405
Dec.	388,346	326,006	62,340	18,670	15,518	3,152	407,016

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

ADVERTISING PAGES REMOVED

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]								NETHERLAND INDIES [4]						
	Gross Exports	Imports	Net Exports	Ceylon [2]	India & Burma [3]	Sarawak [3]	British North Borneo [3]	Siam [3]	Java & Madura	Sumatra E. Coast	Other N. I.	Indo-China [3]	Amazon Valley	All Other [5]	World Total [6]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,413
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,440	54,497	80,347	6,088	23,165	9,065	429,360
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,294	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49 692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	5,551	84,085	139,632	207,863	43,399	15,576	13,063	1,133,864
1938	526,911	156,101	370,810	49,549	14,961	17,792	9,512	41,080	57,526	94,501	145,744	58,518	14,301	13,417	887,711
1937:															
Aug.	64,525	21,395	43,130	7,308	605	1,624	1,189	2,999	6,785	11,563	21,014	2,277	1,248	1,283	101,025
Sept.	67,414	19,065	48,349	5,804	1,092	2,659	969	3,173	6,402	10,862	19,611	4,131	1,007	1,145	105,204
Oct.	59,319	11,858	47,461	6,701	1,248	523	1,505	2,352	6,587	12,172	14,188	3,753	1,434	1,147	99,071
Nov.	57,850	12,396	45,454	4,391	2,135	2,517	1,327	2,549	6,310	10,003	11,596	4,556	963	1,037	92,838
Dec.	56,791	13,949	42,842	9,529	2,708	3,009	1,172	2,957	9,108	12,272	11,731	5,384	2,011	1,032	103,755
1938:															
Jan.	47,986	17,078	30,908	5,222	1,379	3,485	1,307	2,897	4,476	9,283	12,708	6,088	878	1,538	80,169
Feb.	48,899	11,874	37,025	5,216	1,409	8	918	3,266	6,391	8,777	12,154	3,070	1,542	1,032	80,808
Mar.	49,197	15,813	33,384	3,834	1,235	1,564	853	2,837	5,673	10,156	15,447	3,213	1,831	1,322	81,349
Apr.	53,864	9,158	44,706	1,951	1,327	1,728	1,158	1,583	5,967	10,081	12,434	3,647	1,004	774	86,360
May	38,245	10,325	27,920	2,833	1,470	1,648	815	2,507	4,575	7,515	9,944	3,118	1,053	904	64,302
June	42,258	14,394	27,864	3,693	1,318	2,441	643	3,904	4,519	7,788	12,120	4,776	718	818	70,602
July	43,689	18,713	24,976	3,861	1,083	2,057	937	4,710	6,808	8,271	19,955	5,139	625	1,063	79,485
Aug.	47,246	13,735	33,511	4,401	953	965	728	4,793	4,757	7,339	11,006	3,840	1,050	1,074	74,417
Sept.	40,992	10,586	30,406	3,990	1,036	756	284	3,893	4,026	7,052	9,092	8,139	750*	1,292	70,716
Oct.	42,294	16,599	25,695	4,893	1,111	1,612	1,075	4,438	4,486	8,229	17,088	3,638	1,575*	1,200*	75,040
Nov.	39,340	10,219	29,121	6,423	1,271	929	567	3,223	3,975	5,678	9,472	4,035	1,000*	1,200*	66,894
Dec.	32,901	7,607	25,294	3,232	1,369	599	227	3,029	1,873	4,332	4,324	9,815	2,275*	1,200*	57,569

All figures from January, 1934, onward are net exports shown on a "dry rubber" basis as calculated by the International Rubber Regulation Committee. (1) Prior to January, 1934, Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex also is not included in the early years, which on a dry rubber basis was as follows: 1924—1,117 tons; 1925—3,618; 1926—3,263; 1927—2,439; 1928—2,247; 1929—3,574; 1930—2,750; 1931—1,940; 1932—5,193; 1933—10,470, and 1934—14,172 tons. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments on a dry rubber basis were: 1923—18 tons; 1924—90; 1925—6; 1926—20; 1927—½; 1928—1; 1929—2; 1930—11; 1931—2; 1932—2; 1933—1, and 1934—6 tons. (3) Official statistics. (4) Exports from "Other N. I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included in earlier years, which is as follows on a dry rubber basis: 1923—2,342 tons; 1924—1,008; 1925—2,239; 1926—44; 1927—84; 1928—1,395; 1929—437; 1930—2,744; 1931—3,874; 1932—3,488; 1933—5,260, and 1934—5,330 tons. (5) Calculated from official import statistics of principal consuming countries; also includes United States imports of guayule. (6) This total includes the third column for British Malaya and all other figures shown for other territories. (*) Figure is provisional.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,882	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,394	92,707	59,871	98,170	36,088	62,311	24,733	30,462	19,164	14,970	4,343	4,680	2,400	13,063	1,055,356
1937:															
Aug.	49,485	15,757	4,488	8,752	3,506	4,409	2,569	1,226	2,153	1,013	382	1,386	200*	1,692	97,018
Sept.	56,685	15,671	4,820	10,595	2,396	3,666	1,941	1,391	3,184	1,258	337	1,648	200*	1,369	105,161
Oct.	52,926	11,899	4,278	8,076	5,998	2,059	951	3,726	2,470	967	367	1,535	200*	988	96,440
Nov.	54,135	12,878	4,311	8,848	4,787	1,368	2,857	3,725	1,935	925	313	970	200*	846	98,098
Dec.	69,660	10,655	5,736	9,580	2,619	1,995	1,976	1,607	767	1,286	318	1,008	200*	1,890	109,297
1938:															
Jan.	45,596	15,458	4,769	6,314	1,789	4,935	1,857	2,693	574	1,257	300	1,239	200*	1,102	86,083
Feb.	40,977	16,505	5,456	6,959	615	3,173	2,053	2,341	578	974	534	1,114	200*	1,771	82,843
Mar.	42,075	15,911	4,845	10,768	2,123	6,222	1,365	2,162	1,043	961	342	1,088	200*	1,324	90,429
Apr.	31,870	14,653	5,757	6,497	999	5,456	2,397	4,281	640	904	449	971	200*	920	75,994
May	27,809	14,675	5,169	9,595	2,545	3,328	2,422	4,163	1,041	1,137	419	1,283	200*	957	74,743
June	26,429	14,053	4,542	7,460	3,243	2,145	2,399	505	805	853	663	1,149	200*	988	65,434
July	22,209	12,678	5,433	6,927	2,685	3,100	3,641	541	1,215	1,106	526	1,151	200*	635	62,047
Aug.	31,494	12,891	3,662	7,190	1,832	2,034	2,045	739	1,182	1,238	259	965	200*	595	66,326
Sept.	34,436	8,100	5,094	7,390	1,405	3,586	1,832	1,725	1,779	514	385	1,830	200*	608	68,884
Oct.	33,830	3,085	3,791	6,326	3,139	3,204	3,921	2,000*	1,780	848	420	3,022	200*	9	65,575
Nov.	32,567	936	5,322	7,275	3,123	4,665	1,984	4,000*	660	636	530	1,209	200*	200*	63,307
Dec.	37,051	4,134	5,394	7,481	2,198	4,000	2,355			876	263				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]—United States imports of guayule are included in this compilation. *—Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE: THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

SHIPMENTS STAY STERILE
a-sea and ashore

M/V "Kota Pinang" regularly transporting Naugatuck Latex

***Sterilization kills bacteria and prevents odor . . . avoids contamination and spoilage . . . gives you purer, cleaner, whiter* LATEX**

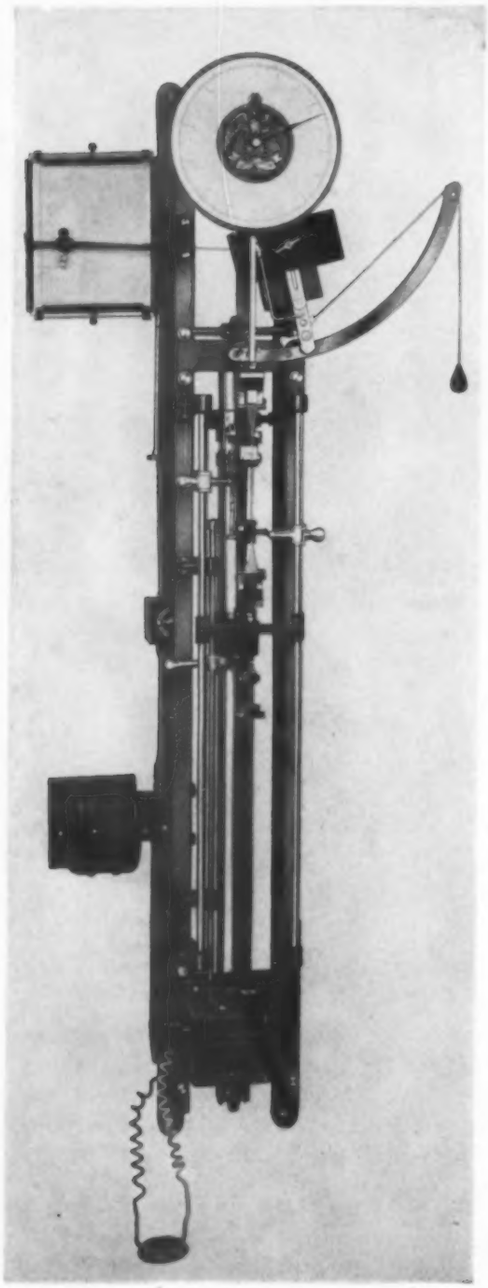
Safeguarded like a new-born babe, each drop of Naugatuck Latex receives hospital-like care the moment it emerges from its tree... through collecting pails, blending tanks, transportation, delivery... to the moment it is to be used in your plant. All containers... from tiny tree-tapping cups to great 120,000 gallon hygienic, specially-lined steamer tanks; and the even larger blending tanks... are not only washed but sterilized and carefully treated prior to the introduction of any Latex.

As a further precaution, temperatures of steamer tanks are controlled to keep the material in perfect condition. Eighteen tests are made, too... at not less than three separate and strategic times during transportation... to assure Naugatuck's specified high quality and uniformity. This special care during transportation... the sterilization, temperature control, testing and re-testing... emphasizes why Naugatuck is called upon to supply most of America's Latex requirements.

Latex
LOTOL
(processed Latex)

Naugatuck Chemical
DIVISION OF UNITED STATES RUBBER COMPANY
1790 BROADWAY • NEW YORK, N. Y.

SCOTT TESTERS*



The illustration shows the latest design of tensile tester for rubber. This machine computes the test of the broad end sample to terms of tensile per square inch and elongation per cent, with a minimum of effort on the part of the operator.

The instantaneous reverse of the pulling jaw and other labor-saving features makes it the fastest and most accurate machine to use.

Full details are in our catalog. May we send you a copy?

We also make Tensile Testing Machines for Textiles, Wire, Sheet Metal, etc., Flexing Machines, Compression Dynamometers and other apparatus for physical analyses.

HENRY L. SCOTT CO.

Providence Rhode Island

**Trade Mark Reg. U. S. Pat. Off.*

PEQUANOC STANDARDS

RECLAIMED RUBBER

▼ ▼ ▼

. . . . UNIFORMITY SERVICE . . . . .

PEQUANOC RUBBER COMPANY

BUTLER, N. J.

ROBERT KNOBLOCK,
Mid-western Representative
2301 Lincoln Way West
Mishawaka, Indiana

HAROLD P. FULLER,
New England Representative
31 St. James Ave.
Boston, Mass.

E. B. ROSS,
Canadian Representative
No. 1 Toronto Street,
Toronto, Ontario, Canada

BURNETT & CO. (London) Ltd.
Triumph House, 189 Regent St.
London, W. 1, England

FOR COMPOUNDING NEOPRENE STOCKS

WE RECOMMEND K&M LIGHT MAGNESIUM OXIDE, TECHNICAL

● For the compounding of NEOPRENE stocks Cyanamid recommends LIGHT MAGNESIUM OXIDE, TECHNICAL, produced by Keasbey & Mattison Company, one of the country's oldest and most reliable manufacturers of magnesia products.

The accompanying tests made in the Rubber Chemicals Division of American Cyanamid & Chemical Corporation's Stamford Research Laboratories indicate how thoroughly this product meets the modern demand for NEOPRENE compounding purposes.

MOISTURE-PROOF CONTAINERS – K&M LIGHT MAGNESIUM OXIDE, TECHNICAL is packed in 50 lb. corrugated cartons with inner liners of crepe paper. These crepe liners are, in turn, enclosed in special moisture-proof liners which are sealed with latex strips to insure the greatest possible protection against moisture absorption. As a result original uniformity is preserved.

Losses caused by moisture absorption are less than ½ of 1% during a period of three months' storage under normal storage conditions, as compared to much higher losses in magnesium packed in other types of containers.

Standardize now in K&M LIGHT MAGNESIUM OXIDE, TECHNICAL. Samples for testing will be sent to you promptly on request.

COMPOUND	
Neoprene E	100
K&M Light MgO. Tech.	10
FF Wood Rosin	5
Thermax	50
AgeRite Powder	2
Sulphur	1
Zinc Oxide	10

SET UP TESTS—WILLIAMS 3 MINUTE "Y" AT 100° C.			
No Heat	.070"		
After 1.5 hours in H_2O at 85° C.	.081"	Change	+15.7%
After 2 hours in H_2O at 85° C.	.085"	Change	+21.4%

Cure at 153° C.	Mod. at 300° Elong. Lbs./In.²	Tensile Strength Lbs./In.²	Elong. %	Shore Hardness
10 Min.	765	1435	695	60
20 Min.	810	1445	695	61
40 Min.	910	1485	625	63
60 Min.	940	1530	615	64

AMERICAN CYANAMID & CHEMICAL CORPORATION

30 ROCKEFELLER PLAZA, NEW YORK, N. Y.

Sales Representatives to the Rubber Industry: Ernest Jacoby & Company, Boston, Mass.; H. M. Royal, Inc., Trenton, N. J., and Los Angeles, Cal.; Herron & Meyer, Chicago, Ill.; Akron Chemical Co., Akron, Ohio.

USMC Top Cementing Machine—Model RB

USMC Top Cementing Machine — Model RB
Single

THIS machine has displaced the slow, untidy and wasteful hand method of cementing canvas tops, gaiter, gum and boot linings, automatic fastener slides and other miscellaneous parts used in the manufacture of waterproof footwear.

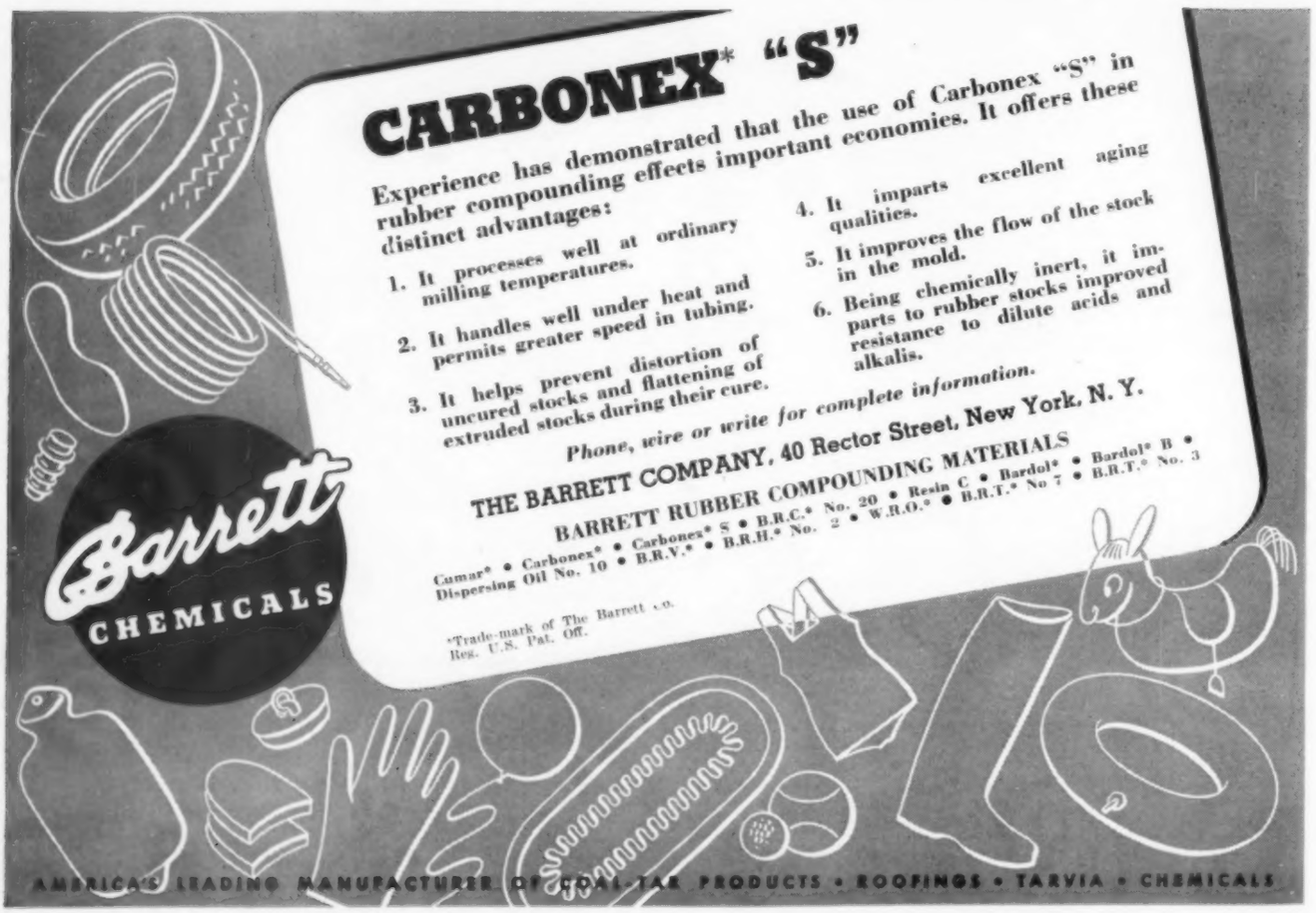
The USMC Top Cementing Machine—Model RB can be fitted for either single or double cementing in widths of 3/16" to 2" for single and ¼" to 1¼" for double work.

It may also be equipped with double attachment for work requiring variable marginal cement lines within ranges mentioned above.

USMC Top Cementing Machine — Model RB
Double

UNITED SHOE MACHINERY CORPORATION

BOSTON, MASSACHUSETTS


CARBONEX* "S"
Experience has demonstrated that the use of Carbonex "S" in rubber compounding effects important economies. It offers these distinct advantages:
1. It processes well at ordinary milling temperatures.
2. It handles well under heat and permits greater speed in tubing.
3. It helps prevent distortion of uncured stocks and flattening of extruded stocks during their cure.
4. It imparts excellent aging qualities.
5. It improves the flow of the stock in the mold.
6. Being chemically inert, it imparts to rubber stocks improved resistance to dilute acids and alkalis.
Phone, wire or write for complete information.
THE BARRETT COMPANY, 40 Rector Street, New York, N. Y.
BARRETT RUBBER COMPOUNDING MATERIALS
Cumar* • Carbonex* • Carbonex* S • B.R.C.* No. 20 • Resin C • Bardol* • Bardol* B • Dispersing Oil No. 10 • B.R.V.* • B.R.H.* No. 2 • W.R.O.* • B.R.T.* No 7 • B.R.T.* No. 3
*Trade-mark of The Barrett Co. Reg. U.S. Pat. Off.
Barrett
CHEMICALS
AMERICA'S LEADING MANUFACTURER OF COAL-TAR PRODUCTS • ROOFINGS • TARVIA • CHEMICALS

FROM ORE TO OXIDE

The Story of St. Joe Zinc Oxide—Number 1 of a Series

THE BALMAT MINE

The mine, mill and town of Balmat, New York, developed and built by the St. Joseph Lead Company during the last ten years.

CLOSE TO THE BEAUTIFUL FOOTHILLS of the Adirondack Mountains, hidden for untold centuries under forest and lake, lay the great zinc deposit now known as the Balmat Mine.

Developed in 1927 and 1928 by the St. Joseph Lead Company, this great ore body which on the surface was a thinly mineralized non-commercial limestone, is currently shipping, with the old "Edwards Mine" ten miles away, 60,000 tons of zinc concentrates, and 70,000 tons of iron pyrites per year. One of the greatest zinc deposits in the United States, its large ore reserves are available for the smelter and refinery of the St. Joseph Lead Company at Josephtown, Pennsylvania, where the well known St. Joe Lead-Free Zinc Oxides are produced by a patented electro-thermic process.

ST. JOSEPH LEAD COMPANY

250 PARK AVENUE • NEW YORK

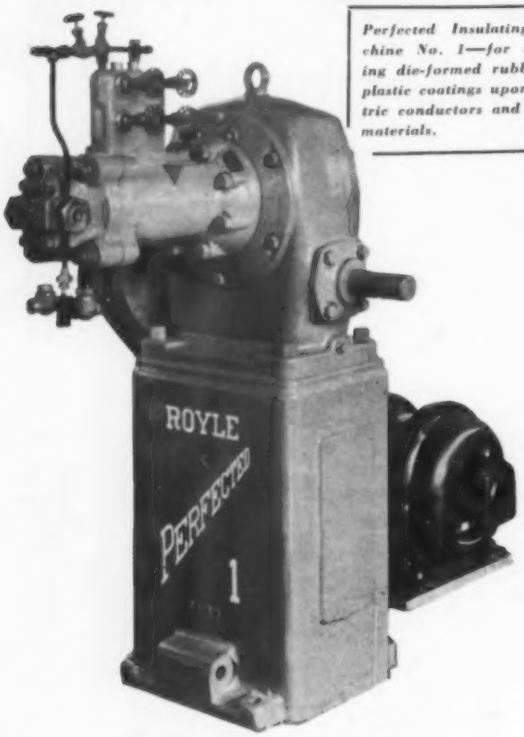
ELdorado 5-3200

PLANT AND LABORATORY, JOSEPHTOWN, BEAVER COUNTY, PENNSYLVANIA

850 to 1400 FEET A MINUTE

No. 18 (.040) A W G wire, 1/64 coating, 35% rubber compound.

Perfected Insulating Machine No. 1—for applying die-formed rubber or plastic coatings upon electric conductors and other materials.



The ROYLE PERFECTED NO. 1 INSULATING MACHINE

— was recently observed doing just that—
— covering 850 to 1400 feet of wire a minute
— three times faster than what has hitherto been considered good production.

Other Factors of Royle efficiency are long, trouble-free life, ease of cleaning, and low maintenance.

ROYLE
PATERSON
N J

JOHN ROYLE & SONS
PATERSON, NEW JERSEY

SHerwood 2-8262
J. C. Clinefelter
Akron, Ohio
Jefferson 9638

Cable ROYLE PATERSON
James Day
(Machinery) Ltd.
London, Eng.

RANDALL & STICKNEY

Hand Grip Rubber Gauge No. 3-B

Height .....9"	Length .....9¾"	Range .....½"
Depth of Throat ....6½"	Dial 50 Divisions Each Div. 1/1000"	Weight .... 4 lbs. Frame . Aluminum

Designed for gauging stock as it is coming from the calender.

FRANK E. RANDALL, Waltham, Mass.

BUY DIRECT FROM TEXTILE MILLS
SELL ALL TEXTILE PLANTS

The new 73rd Year

TEXTILE BLUE BOOK

Reports the Entire Industry

Over 8,000 mills, dyers and finishers.

Over 25,000 firms in allied lines.

To buy or sell in any branch of the textile manufacturing industry, this book is of great value to any firm in the rubber trade.

"A Davison Publication—Standard Since 1866"

1,500 pages in size.

$7.50 for Office Edition
$5.00 for Handy Edition

Send for interesting six page leaflet of full contents!

DAVISON PUBLISHING CO.
New Executive, Production and Sales Offices:
RIDGEWOOD, N. J.

HERE'S A HARD NUT FOR WHITE PIGMENTS TO CRACK . . .

to develop white side wall stocks that will withstand flexing and eliminate cracking and discoloration.

RUBBER pigmented with TITANOX-A (Titanium Dioxide) shows definitely improved resistance to the failures common to white tire side walls.

Specifically, TITANOX-A contributes superior flexing resistance, and produces the brightest and whitest rubber stocks with negligible tendency to discoloration when exposed to sunlight.

Within certain limits of loading, the tendency of the rubber stock to check and crack is reduced. For the economical attainment of such loading, a combination of Titanox-A and Titanox-C is suggested. This combination is low in volume cost, and results in little reduction of desirable physical properties.

Technical inquiry is invited.

TITANIUM PIGMENT CORPORATION

Sole Sales Agent

111 Broadway, New York, N. Y.; Carondelet Station, St. Louis, Missouri; National Lead Co. (Pacific Coast Branch), 2240 24th Street, San Francisco, Calif.

TITANOX

REG. U.S. PAT. OFF.

TITANOX

TRADE MARK

In the lead for more than 40 Years

GUMMI-ZEITUNG

Trade Journal for the

RUBBER, GUTTA PERCHA, ASBESTOS, CELLULOID and Allied Industries

Central Organ for the Whole German Rubber Goods Industry

Published Every Friday

SUBSCRIPTION RATES

In United States .....RM 32
Domestic .....RM 24

Sample copy free

WORLD WIDE CIRCULATION

Main Office of GUMMI-ZEITUNG
Berlin SW 19, Krausenstrasse 35/36

Best Advertising Results for all those desiring to make trade connections in Germany in this field.

Scrap Rubber

CRUDE RUBBER • HARD RUBBER DUST

A. Schulman Inc.

AKRON, OHIO
DARROW ROAD

E. ST. LOUIS, ILL.
14th AND CONVERSE STS.

BOSTON, MASS.
736 STATLER BUILDING

WAREHOUSES • AKRON, OHIO • E. ST. LOUIS, ILL.

LATEX

NORMAL-CONCENTRATED-PROCESSED

LATEX In The Form Most Suitable For Your Requirements

UNIFORM STANDARIZED RELIABLE

Ample Stocks Always On Hand For Immediate Delivery

Trade Mark

HEVEATEX
CORPORATION
78 GOODYEAR AVE. MELROSE, MASS.

Trade Mark

NEW YORK, N. Y. CHICAGO, ILL. AKRON, OHIO

1849 —————— 1939

Ninety years' experience produced

ECK CALENDERS

the world's first

UNIVERSAL CALENDER

"Universal" in the true sense of the word

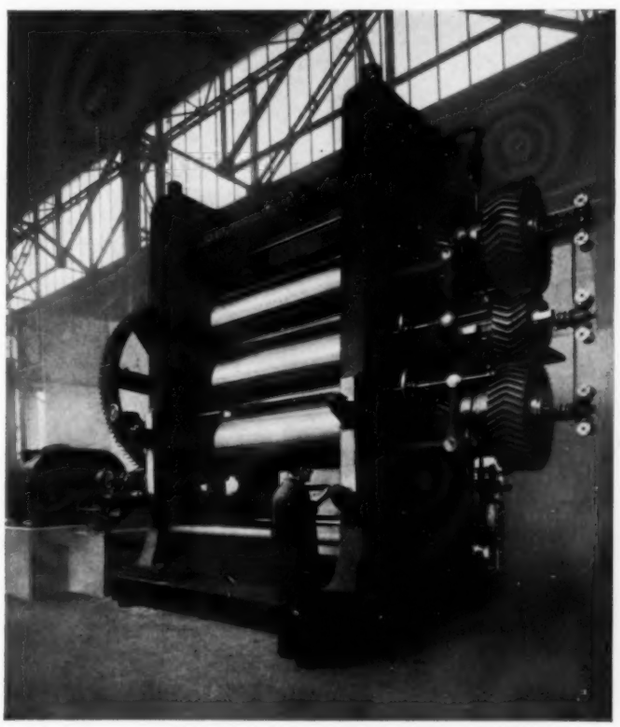
NON-CAMBERED ROLLS AND PATENTED DEVICE TO COUNTERACT THEIR DEFLECTION

Universal application
for any mixture and for
any type of material
to be calendered.

Highest degree of accuracy
in all work.

Cuts costs and waste.

This Super Universal Calender
has rolls of 30 inches diameter
and 85 inches width.

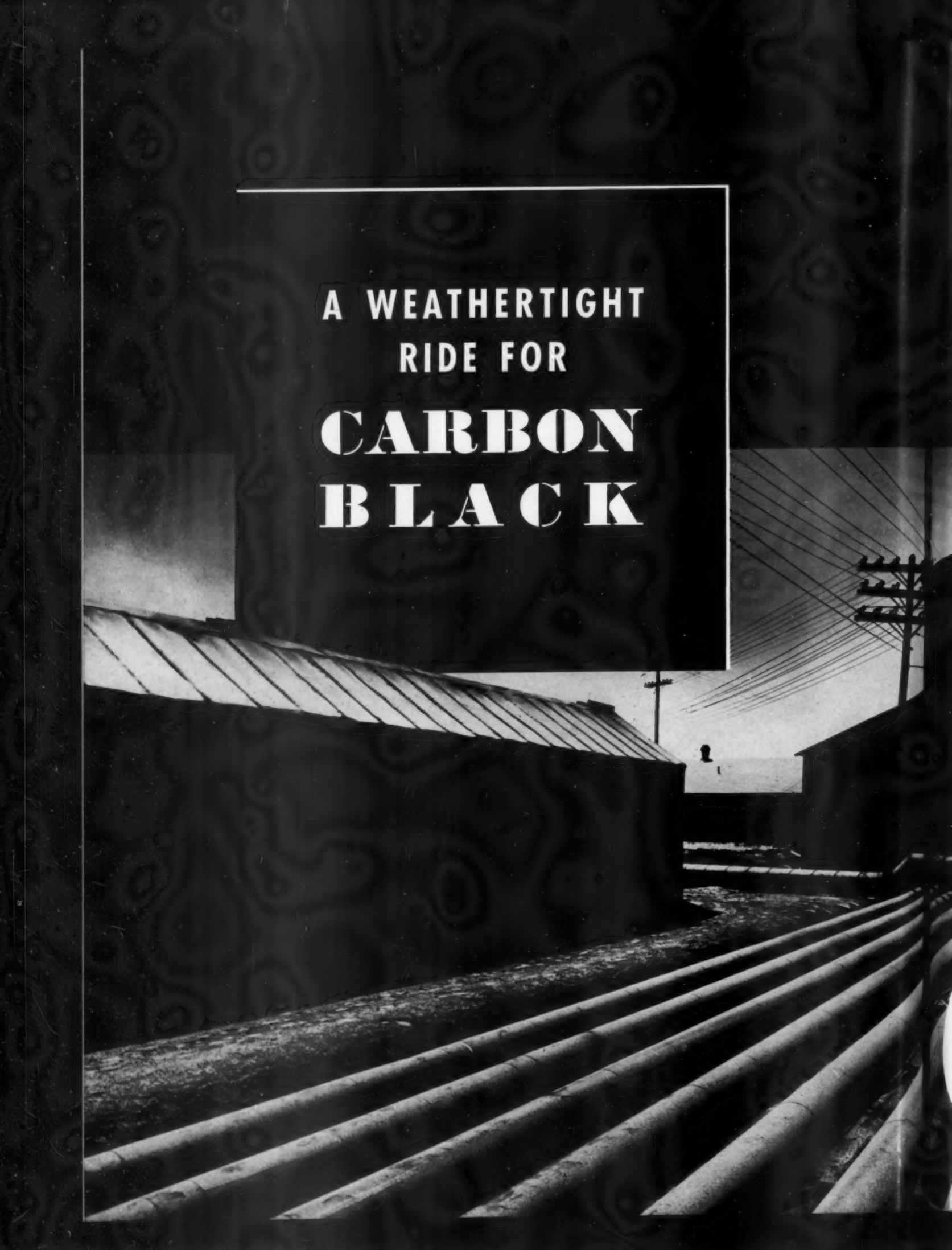


ASK FOR DETAILS

JOSEPH ECK & SONS DUSSELDORF, Germany

U. S. REPRESENTATIVES:

SEAMLESS STEEL EQUIPMENT CORPORATION, 39 BROADWAY, NEW YORK, N. Y.


A WEATHERTIGHT
RIDE FOR
CARBON
BLACK

Miles of screw conveyors, such as shown here, carry Continental Carbon Black from the point of production to the packing houses. It is a safe ride, for the pipes are weathertight and the black flows steadily day and night, rain or shine. Each one of the pipes in the photo carries the product of a single unit of burner houses, unmixed with the product of other units. Thus the unique quality of each grade is kept separate in its course from burner tip to package. Automatic operation of all equipment is the keynote of Continental production. This is supplemented by a constant and rigid system of testing in laboratories. Make sure of uniform results in your formulas—with controlled quality Continental Carbon Black.

Continental

CONTINENTAL CARBON COMPANY · 295 MADISON AVENUE, NEW YORK, N.Y.

UTILITY MANUFACTURING COMPANY

Manufacturers of

Special Machinery

For Quality and Efficiency in Working Rubber

If you have any problems

CONSULT US

UTILITY MANUFACTURING COMPANY

CUDAHY • • • WISCONSIN

Export Representative:
BINNEY & SMITH CO.
41 E. 42nd St., New York City
Cable Address: "EPILOGUE" New York

The Key to **QUALITY + SERVICE**

CRUDE AND SCRAP RUBBER

ALSO
HARD RUBBER DUST

BRANCHES
AKRON
CHICAGO
BOSTON
DETROIT
LOS ANGELES
LONDON
PARIS

H. MUEHLSTEIN AND COMPANY, INC.
122 E. 42nd STREET. NEW YORK, N.Y.

RUBBER COLORS

DRY COLORS—PASTES
—RUBBER DISPERSED—

Our rubber laboratory is scientifically equipped to cope with your color problems.

Ansbacher-Siegle
CORPORATION
Manufacturers of Fine Chemical Pigment Colors
General Offices, Works, and Laboratories
ROSEBANK, STATEN ISLAND, NEW YORK, N. Y.
Boston, Chicago, Los Angeles, Cleveland, Detroit, San Francisco, Richmond, Toronto, Can

Manufacturers of

Rubber Plant EQUIPMENT

We make equipment of practically every type for all requirements of small and large factories

Specialists in Latex Equipment

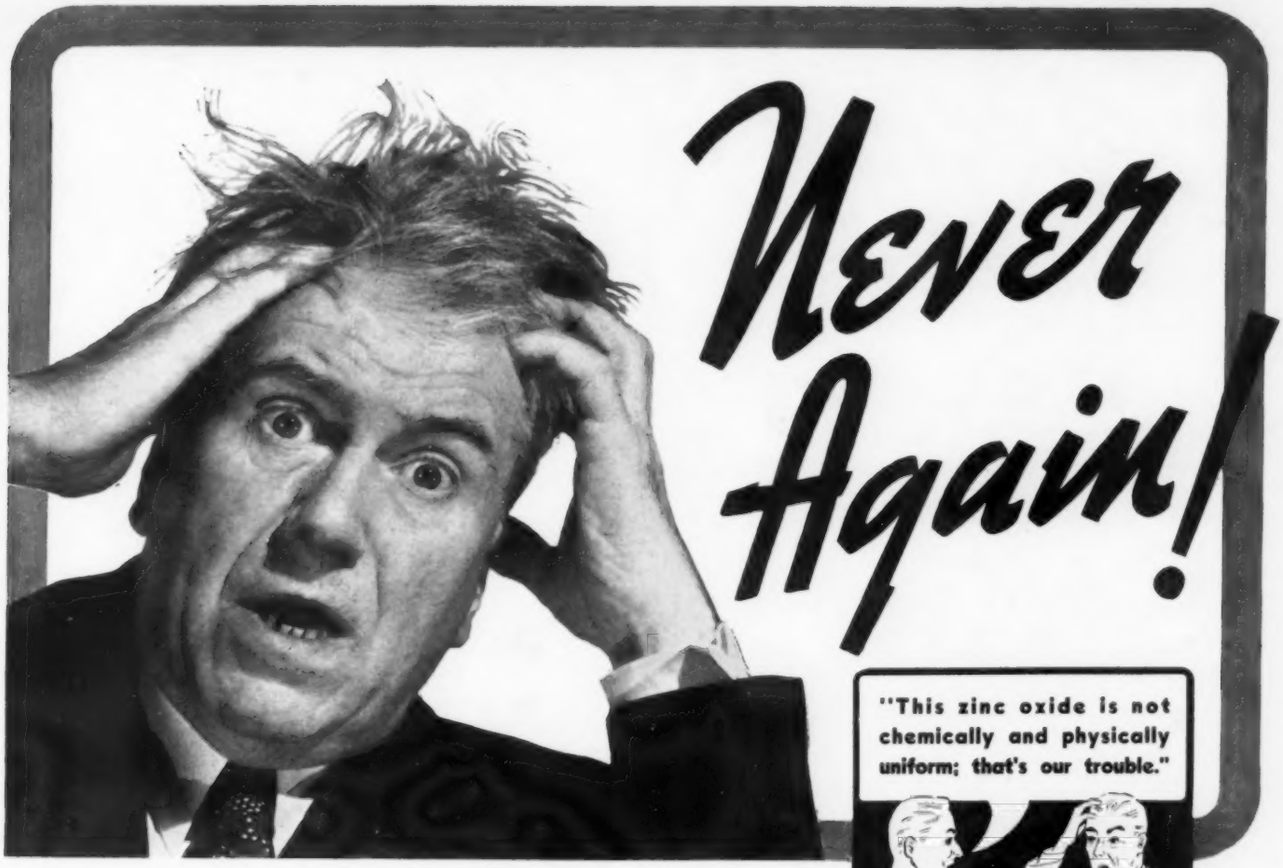
PROMPT QUOTATIONS

Continental Machinery Company

277 Broadway, New York, N. Y.

Telephone: WOrth 2-1650-1651
Cable Address: "Contimac," New York

Our Motto—"Through Service We Live and As We Live We Grow."


Never Again!
"This zinc oxide is not chemically and physically uniform; that's our trouble."
"We get this poor flexing because our zinc oxide is not absolutely clean!"
"We can't lower these costs without a zinc oxide that will process easily!"

Inferior zinc oxides are often responsible for many of the headaches in rubber compounding.

That's why hundreds of compounders specify AZO ZZZ Lead Free Zinc Oxides in the proper rubber grade. These finer quality pigments have been specially designed to meet every requirement of the rubber industry . . . for general use in rubber and tire compounding, insulated wire, hard rubber and white sidewall stocks. They are uniform, absolutely clean and process easily.

AZO ZINC OXIDES

AMERICAN ZINC SALES CO.

Distributors for

AMERICAN ZINC, LEAD & SMELTING CO.

COLUMBUS, O. CHICAGO ST. LOUIS NEW YORK

TEST THESE ADVANTAGES

REVERTEX . . . the concentrated Latex . . . forms the basis of many industrial processes.

Its high viscosity and inherent stability eliminates the necessity of compounding for many applications.

For numerous other processes, it is easily compounded to impart the desired properties to the finished product.

Send for our FREE Booklet
"REVERTEX"
Suggestions for its treatment and use.

REVERTEX CORPORATION OF AMERICA

1 MAIN STREET BROOKLYN, N. Y.

RMP
ANTIMONY
FOR RED RUBBER
ATTRACTIVE . . . NON-DETERIORATING
RARE METAL PRODUCTS CO.
BELLEVILLE, N. J.

The CARTER BELL MFG CO
Springfield New Jersey

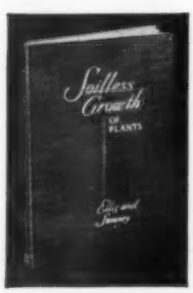
MAGNESIA
CARBONATE OXIDE
ALSO MAGNESITE
Regular and Special Grindings
WHITTAKER, CLARK & DANIELS, INC.
260 West Broadway New York City

1880 Rand 1939
RUBBER GOODS
"They Last Longer"

DRESS SHIELDS	BABY BIBS
DRESS SHIELD LININGS	HOUSEHOLD APRONS
BABY PANTS	SANITARY BELTS
CRIB SHEETS	APRONS—BLOOMERS
BATHING CAPS	SKIRTS—STEPINS
RUBBERIZED SHEETING	CHILDREN'S APRONS

SHEETED RUBBER—PLAIN & RANDPRINT—For Manufacturers
RAIN CAPES and COATS
RAND RUBBER CO., Brooklyn, N. Y.

SOILLESS GROWTH of PLANTS



This is not a rubber book—but every rubber man who has his own garden will be interested in the culture of plants and vegetables by the new soilless method.

It is easy to start the exciting new hobby of soilless growth. Just put bulbs, plants or seed in sand, cinders, excelsior or water and add one of the many available nutrient mixtures containing all the necessary chemicals which provide the food needed for brilliant blooms and healthy produce.

This is the only book available which explains the fascinating principles of soilless growth, giving you full directions for getting started at once.

155 Pages—60 Illustrations (3 in Color)

PRICE: $2.75 (Post-Paid)

Send Orders to Book Department

THE RUBBER AGE
250 West 57th Street New York City

COLORS for RUBBER

Red Iron Oxides
Green Chromium Oxides
Green Chromium Hydroxides

•

Reinforcing Fillers and Inerts

C. K. WILLIAMS & CO.
EASTON, PA.

MECHANICAL MOLDED RUBBER GOODS
Sponge Rubber: Sheeted—Die Cut—Molded
We Solicit Your Inquiries
THE BARR RUBBER PRODUCTS COMPANY
SANDUSKY, OHIO

TEXTILE PROOFERS, INC.
Custom Finishers
of
RUBBER REPELLENT LINERS
One Gates Avenue Jersey City, N. J.

Economic Characteristics of Rubber Tire Production
By L. E. Carlsmith

The book records the results of an investigation of the more important economic characteristics of the producing end of the tire industry, character of their trends, changes in relationships, etc. Primarily, the results are given mathematically and statistically with 37 charts and 48 tables used to illustrate the economic features of the industry.

230 Pages—Cloth Binding—6¼ x 9¼ in.
Complete Bibliography—Index

$4.00 *Postpaid*

THE RUBBER AGE
250 West 57th Street, New York, N. Y.

INTERNATIONAL PULP CO., *41 Park Row, New York, N.Y.*
SOLE PRODUCERS OF PURE **ASBESTINE** SPECIALLY PREPARED FOR USE IN RUBBER
Covered and Protected by Letters Patent Registered at U. S. Patent Office, Washington, D. C.
LIBERAL WORKING SAMPLE FURNISHED FREE

For Economy—Use
BEACON ZINC STEARATE
Zinc Stearate | Zinc Laurate
Calcium Stearate | Barium Stearate
Magnesium Stearate | Aluminum Stearate
Wax Emulsions for the Rubber Industry
THE BEACON COMPANY, 87 Bickford St., Boston, Mass.

AIR BAG BUFFING MACHINERY
STOCK SHELLS HOSE POLES
MANDRELS
NATIONAL SHERARDIZING & MACHINE CO.
868 Windsor St. Hartford, Conn.
Representatives: Akron San Francisco New York

NEOPHAX Reg. U. S. Pat. Off. — **Vulcanized Vegetable Oils FOR NEOPRENE**
"Neoprene can be loaded with FACTICE and fillers to a greater extent than rubber and yet retain its rubber-like properties to a remarkable degree. Such stocks tube smoothly and rapidly, calender nicely at low heats and, when vulcanized, give snappy, rubbery stocks."
Reg. U.S. Pat. Off.

THE STAMFORD RUBBER SUPPLY CO. STAMFORD CONN.
Makers of FACTICE Since 1900
Reg. U.S. Pat. Off.

BOOKS on RUBBER

LATEX AND ITS INDUSTRIAL APPLICATIONS, by Marchionna (Vol. I). 1061 pp.—6 x 9 in . . $15.00

A completely authoritative and thoroughly indexed bibliography on all patents and published literature on Latex covering the period up to June, 1932.

LATEX AND RUBBER DERIVATIVES AND THEIR INDUSTRIAL APPLICATIONS, by Marchionna (Vols. II and III). 1670 pp.—6 x 9 in. $20.00

An extensive and comprehensive supplement to Volume I, covering the period from June, 1932, to December, 1937. Includes abstracts on Latex and on Rubber Derivatives—rubber hydrochloride, cyclized rubber, hydrogenated rubber, etc. A necessary adjunct to Volume I.

Combination price, Vols. I, II and III $30.00

(This offer good only to Nov. 15, 1939)

LATEX IN INDUSTRY, by Noble. 384 pp.—6 x 9 in. $7.00

A new and comprehensive text book which provides information directly useful to the chemist and manufacturer working daily with latex and to those who may contemplate its use. It is complete, practical, fully illustrated and indexed.

RUBBER—PHYSICAL AND CHEMICAL PROPERTIES, by Dawson and Porritt. 700 pp.—9 x 11 in. $12.50

A voluminous reference work presenting all available data on the physical and chemical properties of rubber. Outstanding and unique in that it is the only book of its kind available.

CHEMISTRY AND TECHNOLOGY OF RUBBER (A.C.S. Monograph No. 74), by Davis and Blake. 896 pp.—6 x 9 in. $15.00

An authoritative reference book on both the theoretical and practical aspects of rubber technology. A well-balanced and vital discussion, dealing not only with the theoretical phases, but with up-to-date manufacturing practices as well. Holds a logical appeal for the research investigator, the development engineer, and the student.

SCIENCE OF RUBBER, by Dunbrook and Morris. 770 pp.—6 x 9 in. $15.00

This English translation of Memmler's "Handbook der Kautschukwissenschaft" is an outstanding work on latex, crude rubber, chemistry of rubber and vulcanization, as well as on analysis, miscroscopy, pigment dispersion, physics of rubber, testing, etc.

BIBLIOGRAPHY OF RUBBER LITERATURE FOR 1935, compiled by D. E. Cable. 132 pp.—6 x 9 in. Cloth Bound, $2.00, Paper Bound, $1.00

The first annual bibliography of rubber literature, this book has already proven an invaluable aid to the technologist and librarian whose work requires constant reference to technical articles and publications on subjects peculiar to the rubber industry.

1937 RUBBER RED BOOK—Directory of the Rubber Industry with Annual Bibliography of Rubber Literature for 1936 compiled by D. E. Cable. 370 pp.—6 x 9 in. . . Cloth Bound, $3.00, Paper Bound, $2.00

The first directory of its kind to be published in over ten years, this book contains complete listings of rubber manufacturers in the United States and Canada by product and location, machinery and chemical concerns, fabric, reclaiming, and latex equipment houses, crude rubber dealers, agents and brokers, scrap rubber dealers, and manufacturers of special products used in the rubber industry. There is also a complete latex section, including an article on latex compounding by Royce J. Noble, and the Annual Bibliography of Rubber Literature for 1936. A comprehensive presentation of information necessary to all who are connected with the rubber industry.

CHEMISTRY AND TECHNOLOGY OF RUBBER LATEX, by Flint. 715 pp.—6x9 in. $14.00

The latest text book on latex covering all the general and technical phases of the subject. A valuable and comprehensive source of information for all those interested in this increasingly important industry. Covers a wide variety of subjects from history and source of latex to precise compounding data and manufacturing practices.

THE RUBBER AGE

250 West 57th St., New York City

Add 2% for Sales Tax on copies sent to N. Y. City addresses.